

BAND III.

DIE FUNKENSPEKTREN DER ELEMENTE.

DIE SPEKTREN DER ELEMENTE BEI NORMALEM DRUCK

VON

PROF. FRANZ EXNER UND DR. EDUARD HASCHKEK

ZUGLEICH II. WESENTLICH VERMEHRTE AUFLAGE
DER WELLENLÄNGENTABELLEN FÜR SPEKTRAL-
ANALYTISCHE UNTERSUCHUNGEN

BAND III

LEIPZIG UND WIEN
FRANZ DEUTICKE

1912

Verlags-Nr. 1910.

Die Anordnung der Tabellen der Funkenspektren ist ganz analog jener der Bogenspektren im zweiten Bande. In bezug auf die Eliminierung der Verunreinigungen sowie auf die bei jedem Elemente gemachten Literatur- und sonstigen Angaben gilt das dort Gesagte. Nur die Zeichenerklärung sei hier nochmals wiederholt.

+	bedeutet	unscharf,
d	"	doppelt,
u	"	umgekehrt,
br	"	breit,
r	"	verwaschen nach Rot,
v	"	verwaschen nach Violett,
()	"	daß eine Linie des eingeklammerten Elements über die gemessene fällt,
L	"	Luft.
K. R.	"	Kante einer Bande, die nach Rot,
K. V.	"	Kante einer Bande, die nach Violett abgeschattiert ist.

Da in den Funkenspektren regelmäßig auch die Linien der Luft auftreten, so haben wir zur Bequemlichkeit bei analytischen Untersuchungen das Luftspektrum als ein Ganzes den übrigen Tabellen vorausgestellt, während sich die Spektren von Sauerstoff und Stickstoff gesondert in den Tabellen finden.

Luft.

Ältere Messungen: O. Neovius, Bihang. Svensk. Vet. Ak. Handl. 17, 1 (1891). J. M. Eder und E. Valenta, Sitzber. der K. Akad. der Wiss. Wien 118, IIa. (1909). A. Kretzer, Zeitschr. für wiss. Phot. 8 (1910). W. Schwetz, Zeitschr. für wiss. Phot. 8 (1910).

2318·71	1 + O	3845·27	1 + N	4114·20	1 + O
2418·70	1 + O	48·18	1 + O	16·65	1 + N
33·63	1 + O	50·65	1 + N	19·46	8 + O
45·55	1 + O	51·50	1 + O	20·62	3 + O
2522·30	1 + O	57·2	1 + N	21·73	2 + O
3007·42	2 + O	61·83	1 + N	24·27	2 + O
3135·3	1 + O	63·70	1 + O	29·60	1 + O
39·45	1 + O	64·74	1 + O	33·02	2 + O
3265·41	1 + O	82·47	3 + O	33·85	2 + N
3320·80	1 + O	93·43	1 + N	42·36	1 + O
25·1	1 + O	3907·73	1 + O	43·89	1 + O
29·55	2 + N	09·29	1 + N	46·03	4 + N
31·89	2 + N	12·20	3 + O	52·21	1 + N
54·20	1 + O	19·24	10 + N	53·56	4 + O
66·0	1 + N	40·20	3 + N	56·83	1 + O
67·43	1 + N	45·25	3 + O	69·49	2 + O
74·2	1 + N	47·55	1 + O	72·0	1 + O
77·33	1 + O	54·55	4 + O	76·16	3 + N
90·43	2 + O	56·04	6 + N	79·80	1 + N
3408·39	1 + O	73·44	8 + O	85·72	6 + O
37·43	3 + N	82·90	2 + O	90·06	8 + O
71·08	1 + N? O?	95·26	50 + N	96·20	1 + N
3545·23	1 + N? O?	4014·1	1 + O	99·2	1 + N
60·43	1 + N? O?	25·77	3 + N	4206·80	2 + N
89·2	1 + N? O?	35·07	4 + N	11·5	1 + N
94·60	1 + N? O?	41·48	5 + N	22·5	1 + N
3709·45	1 + O	56·5	1 + N	23·35	1 + N
12·95	2 + O	63·70	1 + N	28·56	3 + N
27·47	4 + O	70·04	10 + O	36·93	5 + N
29·41	1 + N	72·40	10 + O	41·94	5 + N
44·4	1 + N? O?	76·08	10 + O	53·74	1 + O
49·66	5 + O	79·11	2 + O	66·45	1 + N
54·82	1 + O	81·70	1 + N	76·0	1 + N
58·41	1 + N	85·36	3 + O	82·43	1 + N? O?
60·00	1 + O	89·23	2 + O	4303·74	1 + O
71·09	1 + N	93·15	3 + O	17·27	3 + O
3804·23	1 + O	97·43	3 + N	19·78	3 + O
24·23	1 + O	4103·46	3 + N	25·85	1 + O
30·82	2 + N	05·15	5 + O	27·61	1 + O
39·30	3 + N	11·06	2 + O	28·70	1 + O
43·12	1 + N	12·26	2 + O	31·23	1 + O

4332-10	1	-	N	4621-57	4		N	4987-58	1	-	br, N
37-01	2	-	O	30-73	15		N	91-4	1	-	N
45-71	3	-	O	34-20	1		N	94-60	1	-	N
47-58	2	-	O	38-99	2	-	O	5001-54	3	-	N
48-14	2	-	N	40-70	1	-	N	05-30	3	-	N
49-57	6	-	O	41-94	3	-	O	07-50	2	-	N
51-54	3	-	O	43-27	5	-	N	10-79	1	-	N
61-80	1	-	N	49-26	5	-	N	16-5	1	-	br, N
67-04	3	-	O	51-00	2	-	O	25-8	1	-	br, N
69-48	1	-	O	54-78	1	-	N	45-28	2	-	N
71-7	1	-	br, N	61-76	2	-	O	5176-06	1	-	br, N? O?
79-75	1	-	N	75-1	1	-	N	79-63	1	-	N
92-5	1	-	N	76-34	2	-	O	5250-8	1	-	N
96-14	2	-	O	97-75	1	-	br, N	5432-35	1	-	br, N
4401-33	1	-	N	99-33	2	-	O	52-38	1	-	br, N
15-07	8	-	O	4705-40	1	-	N	54-41	1	-	br, N
17-14	5	-	O	05-57	2	-	O	80-28	1	-	br, N
26-08	2	-	N	10-3	1	-	O	95-90	2	-	br, N
30-30	1	-	N	18-58	1	-	N	5526-33	1	-	N
32-62	2	-	br, N	26-90	1	-	br, N	30-30	2	-	N
34-4	1	-	N	35-78	1	-	br, N	35-40	2	-	N
43-29	1	-	O	51-4	1	-	br, O	52-07	1	-	br, N
47-23	20	-	N	64-90	1	-	br, N	66-5	1	-	N
52-57	2	-	O	74-4	1	-	br, N	5666-78	10	-	N
60-25	1	-	N	79-95	2	-	N	76-15	5	-	N
65-54	2	-	O	81-42	1	-	br, N	79-70	20	-	N
68-06	2	-	O	88-30	3	-	N	86-40	5	-	N
69-55	1	-	O	93-90	2	-	N	5710-89	2	-	N
77-95	1	-	N	4803-33	5	-	N	30-7	1	-	br, N
4507-78	2	-	N	06-08	1	-	N	47-47	1	-	br, N
14-95	1	-	N	10-38	1	-	br, N	67-60	1	-	br, N
30-08	2	-	N	47-85	1	-	br, N	5928-05	3	-	br, N
44-88	1	-	N	79-9	1	-	N	32-05	5	-	br, N
52-65	1	-	N	95-53	1	-	N	40-7	2	-	br, N? O?
91-13	3	-	O	4907-05	1	-	O	41-9	10	-	br, N
96-31	3	-	O	24-81	1	-	br, O	52-6	1	-	N
4601-67	5	-	N	41-28	1	-	br, N? O?	6170-7	1	-	br, N? O?
07-34	4	-	N	43-16	1	-	br, O	6482-28	2	-	N
09-73	1	-	O	54-5	2	-	br, O	6610-68	1	-	br, N
14-05	3	-	N								

I. Ad. Aldebaranium.

Ältere Messungen: C. Auer von Welsbach, Sitzber. der K. Akad. der Wiss. Wien, Bd. 116, Abt. II b. (1907).

Material: Aldebaraniumnitrat aus Oxid von C. Auer von Welsbach, auf Gaskohle.

Verunreinigungen: Cp, Tm.

Linienzahl: 795.

2224·58	1	2683·50	1	2767·63	1	2842·32	1 + Cr ?
40·14	2	84·84	2	71·45	3	42·69	1
57·09	1	88·05	1 +	72·70	1 + Cp	43·11	2
62·39	1	91·06	3	74·47	1 +	43·9	1 + br
65·75	1	92·10	1	76·40	4	44·95	1 +
83·08	2	92·70	1	79·45	1	47·32	3 +
2305·41	3	95·54	1 +	80·00	1 +	47·60	2 + Cp
09·39	2	96·70	1 +	83·85	1	48·55	3
14·58	2	2700·88	1	84·80	3	49·44	2
38·07	1	01·80	1 + Cp	88·44	2	51·23	10
2567·75	5	04·05	1	89·60	1	51·95	2
79·70	3	08·95	1 +	93·40	2	53·51	2
96·25	1	09·80	1	94·55	2 +	53·79	1
96·40	1	10·65	3 d ?	94·91	1	54·21	3
97·38	1 +	11·89	1	95·24	1	54·59	2 Y ?
99·28	1 +	12·43	3	96·73	1 + Cp	58·50	3
2603·40	1 + Cp	12·73	2	97·35	1 Tm	59·50	4
15·49	2 Cp	18·43	3	99·48	1	59·90	6
17·10	1 +	19·10	1	2800·12	3	60·51	2
21·24	3	19·53	1 + Tm	03·55	15	61·34	4
27·16	1 +	22·29	1	04·36	1	61·44	4
38·20	2	32·80	3	08·40	1	65·44	1
39·53	1 +	34·20	1	08·69	1 +	66·30	1
40·61	1 +	41·82	2	10·85	1	67·19	5
42·03	1 +	47·69	1 +	14·35	1 +	69·31	2 Tm ?
42·64	8	48·75	4	14·64	2	70·17	2
44·42	2	50·07	3	16·45	1	71·85	1
46·55	1 +	50·60	10	17·09	5	73·53	1
49·89	1 +	51·55	3	18·89	15	76·01	2
51·82	5	53·42	2	21·25	4	79·27	2
52·32	5	55·05	1	23·68	2	82·03	2
53·83	10	55·86	3	24·30	1	82·24	1
56·20	1 +	56·1	1 + br	25·10	3	86·07	2
60·10	1	56·94	1 +	28·03	1	86·39	3
65·12	3	59·12	2	31·10	5	88·15	4
66·20	8	59·67	1	31·67	1	91·50	20
67·09	8	60·89	2	32·31	1	93·75	3
68·85	1	61·50	2	35·10	2	95·05	2 + d, Cp
72·73	4	64·50	2	38·75	1	97·02	3
77·46	3	65·67	1	41·44	1	98·49	3

2899:39	1 +	2962:64	4	3019:15	1	3088:94	1 +
93:85	3	63:39	3	19:58	1	89:21	5
2900:41	1 Cp	63:57	4	22:57	2	90:90	1 +
02:55	1	64:54	2	23:74	1	92:64	5
03:06	2	64:89	3	25:05	1 +	93:54	1
06:50	5	66:00	1 Tm	26:78	15	93:99	4
06:98	1	66:90	3	28:50	1	95:00	1
08:22	2	69:94	1 Cp	29:69	10	95:35	1 + d
08:44	2	70:70	4	31:24	5	97:00	1 +
09:30	2	70:98	3	33:97	1	98:70	1
09:60	3	72:65	1	34:75	3	3101:48	4
11:61	8 Cp	75:70	1	36:94	2	02:17	3
12:45	1	77:65	1	38:11	2	08:00	30 r, u
14:35	10	79:03	1	38:64	1	09:90	1 +
15:38	3	79:80	1 +	39:80	4	13:08	1 +
16:56	2	79:99	1	42:78	5	13:50	1 +
19:49	15	81:60	1	44:14	2	14:86	1
21:23	3	82:17	1	44:95	2	15:42	8
24:34	3	82:62	3	46:60	3	16:15	2
25:76	1 Tm	82:71	2	47:18	3	16:56	2
26:80	1d(Tm)	83:80	3 +	50:86	1 Tm	16:75	3
27:99	2	84:09	5	54:13	1 +	17:90	10
29:14	2	84:95	2 +	55:29	1	19:77	1 +
33:16	1	85:14	3	56:20	1 Tm	22:29	1
35:22	3	85:95	2	56:87	1 + Cp	22:63	1
36:10	1 Tm	86:10	1	58:04	1 Cp	23:60	1
37:28	2	88:01	1 +	63:24	3	24:03	1
38:29	1	89:30	1	63:80	3	25:02	1
38:60	1	89:88	1	64:35	1	25:55	1
39:44	1	90:47	3	65:13	10	26:20	10
39:62	2	91:99	4	68:39	2	27:23	1
40:61	3	94:04	3	68:80	1 +	27:94	2
42:13	2	94:90	8	71:71	2	29:20	2
42:90	1 +	95:94	3	73:20	2(Tm)	30:5	1 + br
44:53	2	98:11	3	73:60	1 +	31:38	3 Tm
46:02	10	98:45	1	73:79	2	32:73	2
46:40	3	3000:59	8	73:90	1 +	33:99	2 Tm
46:85	2	01:40	1	74:62	1 +	36:88	4
47:23	1 +	02:16	1	75:33	1 +	38:73	2
49:30	2	02:71	5	76:16	2	41:02	10
50:42	2	05:85	20	77:30	1 +	41:84	4
51:15	1	06:95	1 Ca?	77:71	3 Cp	45:19	5
51:50	1 +	09:51	8	78:52	1 +	45:68	1 +
51:86	1 +	10:72	5	80:66	1	46:25	1
53:15	1	13:78	1 + Tm	83:38	1	49:12	2
55:42	2	14:60	5	84:47	2	51:16	2 Tm
59:75	1	15:40	2	85:30	1	51:57	1
60:97	2	17:20	1 +	85:93	2	53:30	3
61:93	2	17:70	10	87:08	3	53:98	10

3155.33	3	3232.11	3	3305.80	4 r	3385.64	1
55.91	1	34.67	2	06.89	3	87.65	1
57.47	1 Tm	35.61	1 + Tm	08.11	1	90.45	1 + d
58.42	3	36.25	3	09.50	4	91.22	4
63.91	5	36.65	1	09.90	2	92.50	1 +
65.31	4	36.93	1 Tm	10.69	1	94.60	3
68.00	1	39.31	3 +	12.21	1	96.45	3
68.31	1 Tm	40.35	1 Tm	13.89	1 +	97.20	4 Cp
68.53	1	41.66	2 Tm	15.49	3	97.65	3
69.19	8	49.98	1 Tm	16.26	1	98.14	1
71.31	2	51.45	1	16.98	2	3400.09	1
72.94	2 Tm	51.76	1	18.40	1	01.10	3
73.91	3	53.05	1 +	19.27	10 d	02.40	1
75.86	3	53.6	1 + br	20.40	2	04.24	4
81.03	3	54.40	3	24.24	2	07.64	1
85.56	1 +	56.13	1 +	24.60	1 +	08.68	1 +
86.72	2	58.18	3	25.67	2	10.20	1 +
89.12	1 +	59.21	3	27.84	1 +	12.60	1 +
90.94	1	61.63	4	29.50	1 +	16.10	1
91.53	3	61.80	5	31.31	1	17.01	2
93.01	20	64.24	1	33.19	5	18.54	1
94.34	2	65.10	2 +	37.30	2	19.75	2 +
94.85	3	66.10	1 +	41.20	1	25.25	5
95.70	3	66.76	2	43.11	5	25.76	2
96.16	1	67.51	2	46.62	1	26.19	2
96.46	1	69.11	2 Tm	47.67	5	27.26	1
98.24	1 +	71.28	2 +	50.05	1	28.60	10
98.80	8	71.65	2 +	51.20	1 +	30.10	3
99.95	1	75.90	3	52.60	1	31.29	3
3201.30	10	76.94	1 Tm	53.85	1	36.59	4
02.68	1 +	78.3	1 + br	54.99	1 Tm	38.84	4
04.11	1	78.5	1 + br	56.00	2	38.97	4
04.81	2	79.12	1	57.10	2	40.25	3
06.30	2	81.89	1	59.74	1	41.14	2
07.84	1	83.52	2	61.33	1 d	41.65	3
10.26	4	84.80	1	61.70	1 +	44.01	1
10.67	1 Tm	85.75	2	62.63	1 +	44.78	1
13.51	1 +	87.08	2	62.80	4 (Tm)	47.01	3
15.63	1	89.50	200	63.80	1	48.15	1 +
16.08	2	91.12	2	66.12	4	49.90	1
17.34	8	94.45	3	68.50	1	52.52	1
18.49	4	97.95	3	69.74	1	53.80	3
21.40	2	98.95	1 +	74.66	2	54.21	10
21.64	1	3301.60	1 + br	75.65	15	56.33	1
23.26	1	01.95	1 + br	76.70	1 +	58.39	8
26.00	5	02.56	3	78.58	1 +	59.33	1
26.89	1	04.68	3	79.90	5 +	60.38	2
28.76	5	04.88	3	82.68	1	62.31	4
29.95	1	05.35	1	84.20	3 +	64.45	5

3465.99	2	3557.30	1	3655.90	1 +	3750.30	1
67.19	3	57.91	1	61.05	1 +	51.92	1
70.03	2	58.64	1	64.75	3	52.35	1
70.90	2	60.49	3	64.92	2	53.20	1 +
72.60	3 Cp	60.89	5	65.97	1	54.02	1
74.97	3	62.80	2	66.80	1 +	55.60	1
75.57	2 (Fe)	64.10	3	67.45	1 +	56.42	1
76.44	4	66.05	2 Tm	68.26	2	57.00	2
78.99	20	66.64	2	69.89	5 r	59.30	1 +
81.89	1	67.29	3	70.84	4	61.10	2
85.89	4	67.99	1	73.30	1	61.47	4 Tm, Tj
87.7	1 + hr	70.71	3	75.21	10	62.03	3 Tm
88.51	1	72.65	1	78.14	1	62.67	2
88.94	2	74.20	1	79.05	2	66.26	2 +
91.75	1 +	77.20	3	83.30	1	68.38	2
92.71	1	85.60	5 +	87.28	2	70.30	3 +
93.08	1	85.99	1 +	87.72	2 (Fe)	71.60	3
95.31	1	86.99	1	90.70	5	76.16	2
3502.30	2	90.50	2	91.60	3	77.23	1
03.80	1	93.53	1 +	94.35	200	78.92	2
06.74	2	96.64	1 +	98.75	8	79.42	2
07.51	3 Cp	99.35	1	99.93	2	81.80	2
07.98	4	3600.56	2	3700.40	3 Tm	82.70	5
12.79	1	00.92	3	01.50	4 Tm	83.69	2
13.20	1	04.01	2	03.52	3	84.01	2
16.00	3	06.62	4	04.99	2	84.53	1
18.30	3	07.55	1	08.82	2	85.50	2 r
20.42	10	08.64	1	09.36	1	87.31	3
29.20	1 +	09.69	1	10.44	4	90.10	2 +
31.39	1	10.36	3	12.0	1 + hr	91.60	1 +
34.20	1	11.47	4	12.95	1 +	94.51	2
34.70	1	14.18	1 +	14.30	1	95.91	5
35.00	2	18.20	1	16.20	1	3802.93	1
35.65	3	19.99	8	18.04	3	06.34	2 +
36.33	2	21.12	2	20.60	1	07.71	3
36.70	2	24.16	1 +	21.10	2 +	15.02	2
39.50	1	24.78	2	22.41	5	16.38	4
42.53	1 +	30.05	2	24.33	5	18.38	1 +
43.30	1 +	32.73	2 +	25.20	2	18.84	1 +
44.25	1 +	34.70	1	28.80	1	30.54	1
45.06	1	37.94	5	29.22	1	33.20	2
45.89	1 +	43.81	2	29.91	2	34.73	1 +
48.60	1	44.41	2	30.52	3	35.50	1
49.05	1	47.41	1	34.25	4	36.68	3
49.98	5	48.65	1 +	41.22	2	45.06	2 +
52.46	2	49.93	1 +	44.19	3	48.13	8
52.86	1	50.98	1	44.79	1 +	57.25	1
53.70	1	53.17	1 +	46.15	1	58.00	1
54.59	4 Cp	53.80	2	49.85	3	64.64	2

3869.48	2	4040.25	2	4190.49	4	4481.48
87.47	2	43.22	2 +	4200.12	1 + Tm	87.43
90.65	1	47.55	1 +	03.90	2 Tm	94.20
3900.94	2	50.30	1 +	18.75	5	4515.33
04.93	4	52.49	1 +	28.07	1 +	18.75
05.99	1	56.35	2 r	34.71	2 +	22.72
11.43	1 +	77.43	4	42.31	3 Tm	53.79
16.61	1	86.86	1	48.09	1 +	76.39
34.45	1 +	89.83	1	52.70	5	82.53
38.40	2	91.70	1 +	55.99	1	91.00
38.66	2	94.37	3	57.82	2	98.53
47.10	1 +	98.04	1 +	67.17	1 + (C)	4616.11
49.26	1	4106.00	3	4306.15	1 +	83.99
49.38	1	13.23	1 +	17.12	5	4713.00
58.25	3	19.61	2	22.38	2	26.24
73.43	3 +	23.00	1	39.24	1 +	86.82
88.20	20	23.39	1	60.09	1 Tm	4820.47
91.05	2	35.28	8	70.96	4	37.14
95.72	1 +	49.23	1	86.60	1 Tm	4935.70
96.67	2	52.46	1	89.92	1 +	37.45
4001.03	1 +	70.23	4	93.00	1 +	5335.32
19.51	1	81.01	5	4402.41	2	53.12
28.42	2 +	84.40	2 + Cp	09.48	1	5556.64
31.85	1	87.80	3	39.38	2	6489.35

II. Ag. Silber.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der
der Wiss. Wien, Bd. 63 (1896).

Material: Ultraviolett: Feinsilber aus der kaiserlichen Münze.
Sichtbar: Silbernitrat auf Gaskohle.

Verunreinigungen: Ca, Cu, Fe, Pb, Si.

Linienzahl: 380.

2106.77	1 +	2171.05	1 + br	2211.25	2	2246.50
13.90	2 +	71.85	1	18.93	1 +	48.81
20.51	2 +	73.64	1	19.75	2 +	50.33
21.02	1 +	86.88	2	23.15	1	53.52
25.54	1 +	91.97	1	26.25	2 +	57.48
29.17	1 +	96.33	1	29.65	3 +	73.37
45.75	2 +	97.27	1 +	33.80	1	74.23
49.38	1	2202.18	2 +	38.47	2	75.39
62.03	2	03.71	1 +	40.50	2 +	77.50
66.13	1 +	04.50	1 +	41.42	1	80.10
66.65	2	06.02	2 +	41.87	1 +	82.74
69.73	1 +	08.58	2 +	43.6	1 + br	86.57

2291.17	1	2445.64	1	2619.72	1 +	2943.75	1 +
96.15	2 +	46.42	5	20.90	1	57.6	1 +
2309.7	3 +	48.01	20	25.80	3 + (Fe)	83.65	1 +
12.5	1 + br	50.49	1	28.70	4	86.5	1 +
14.8	1 + br	53.39	20	37.63	1	91.75	1 +
15.40	1 +	57.72	1 +	37.98	1	3013.06	1
17.13	8	60.40	10	43.67	1	28.45	1 +
18.60	2	61.36	1 +	56.94	10	81.1	1 +
20.37	10	62.34	10	57.88	1	96.7	1 + br
21.64	2 +	64.05	1 +	60.59	20	99.24	1
24.76	6	66.47	1 +	76.75	1 +	3102.96	1 +
25.20	6	69.67	3	81.48	15	14.8	1 + br
29.2	1 +	71.44	1 +	84.97	1 +	15.8	1 + br
31.48	10	73.00	3	88.49	2 +	18.05	1 +
32.37	2	73.92	20	2708.53	1	24.15	1 +
33.80	1 +	76.30	1 +	11.31	8	30.1	1 + br
39.25	2	76.83	1 +	12.17	30 r	30.8	1 + br
42.00	2	77.34	15	16.27	1	42.2	1 +
43.85	1 +	79.40	1 +	17.38	1 +	50.0	1 +
58.00	8	80.50	10	21.86	3	53.30	2 +
58.95	6 r	85.87	4	44.02	6	72.35	1 +
62.28	4	86.73	2 +	56.58	20	73.77	1 +
64.09	5	2504.20	6	67.64	50	74.3	1 + br
65.77	2 +	04.87	1	86.60	2 +	76.55	1 +
73.79	2	06.72	10	99.80	20	77.8	1 +
75.0	2 + br	07.39	2 +	2815.68	10	80.85	3
79.8	1 +	09.23	1	21.2	1 +	84.3	1 + br
80.2	1 +	21.28	1 +	23.97	1 +	85.25	1 +
83.25	2 +	30.6	1 +	27.3	1 +	86.1	1 +
86.40	2 +	32.8	1 +	29.3	1 +	87.95	1 +
86.91	2	35.39	10	34.52	1	92.0	1 +
90.66	5 +	37.92	1 +	37.87	1 +	93.7	1 +
93.06	2 +	39.47	1 +	44.1	1 +	98.35	1 +
95.76	3	53.52	2	49.6	1 +	3200.18	1 +
97.74	1	57.6	1 + br	52.7	1 +	02.00	2 +
2402.68	3 +	62.64	1	57.4	1 +	03.83	1 +
05.08	3 + r	63.02	5	62.3	1 +	07.50	1 +
09.09	1 +	64.50	5 +	70.85	1 +	08.38	1 +
10.20	2	67.28	2 +	73.73	10	10.2	1 +
11.49	15	75.8	1 + br	78.06	1	15.65	1 +
13.31	20	80.86	20	78.90	1	16.85	2 +
14.91	1	84.30	1 +	82.3	1 +	18.2	1 +
20.19	10	86.30	1	96.61	10	18.85	1 +
22.70	2 +	95.76	3 +	2902.20	10	21.6	1 +
28.29	3 +	98.6	1 +	17.05	1 +	23.63	3 +
29.73	20	2602.27	1	20.18	5 +	25.20	1 +
36.70	2	06.23	10 +	29.48	10	29.15	1 +
37.89	30	14.65	10 +	34.35	20	30.15	1 +
44.30	8	17.21	1 +	38.66	6	31.5	1 +

3233·25	1 +	3304·2	1 +	3389·95	1 +	3877
40·95	1 +	04·7	1 +	94·1	1 +	3984
41·38	1 +	07·35	1 +	97·65	1 +	20
45·10	4 +	08·70	1 +	3405·25	1 + Co?	37
46·0	1 +	12·82	2 +	21·8	1 +	43
47·37	1 +	15·5	1 + Ti?	29·6	1 +	49
49·3	1 +	16·45	1 +	45·63	1	51
50·05	1 +	18·35	1 +	51·10	1	81
51·4	1 +	21·90	1 + Ti?	67·9	1 +	85
52·92	2 +	23·0	1 +	69·39	1	4004
54·0	1 +	26·05	1 +	75·99	2	22
56·7	1 +	29·15	1 +	95·45	1	27
57·5	1 +	30·77	1 + Sn?	99·8	1 + br	36
58·7	1 +	32·02	2 +	3501·85	2 +	37
62·9	1 +	33·82	1 +	05·25	1 +	55
64·37	1 +	34·5	1 +	13·38	1 +	86
67·50	1	39·35	1 +	15·6	1 +	96
68·6	1 +	41·45	1 +	42·74	4 +	4212
69·95	1 +	43·34	1	47·3	1 +	4311
70·3	1 + br	44·85	1 +	68·3	1 +	85
76·20	1 +	47·65	1 +	96·31	1	4476
80·81	100 u	49·45	1 +	3612·73	1 +	4555
86·08	1 +	52·21	2 +	16·5	1 + br	4615
86·9	1 +	53·4	1 +	74·28	2 +	20
88·1	1 +	54·5	1 + Co?	82·64	1	20
89·30	2 +	61·20	1 +	83·49	5	68
92·6	1 +	61·9	1 +	90·9	1 + br	78
93·18	1 +	65·05	1 +	94·85	1 +	4874
94·43	1 +	67·03	1 +	3714·30	1 +	5209
95·70	1 +	71·8	1 +	40·3	1 + br	5401
97·87	1 +	72·65	1 +	63·25	1 + br	04
99·0	1 +	83·03	100 u	3810·7	1 + br	65
99·60	2 +	87·23	1 +	73·5	1 + br	71
3301·70	3 +	89·5	2 + br			

III. Al. Aluminium.

Ältere Messungen: C. Runge, Wied. Ann. 55 (1895) (von λ 1

A. Hemsalech Phil. Mag. 44 (1897) (Rot) A. de G

(1898) I. M. Eder und E. Valenta Sitzber. der k. Akad

II a (1909) (Rot).

Material: Käufliches chemisch reines Metall.

Verunreinigungen: Ca, Fe Ga, Mg, Mn, Si, Ti.

Linienzahl: 115.

2263·50	1 +	2312·54	1 +	2315·05	1 +	2319
69·15	1 +	13·61	1 +	17·53	1 +	23

2367·18	2 +	3050·30	1 + Cr ?	3587·05	100 + br	4400·4	1 + br
67·70	1 +	54·90	1	3601·98	30 +	48·4	1 + br
68·20	1 +	57·40	2	12·62	20 +	66·65	1 + br
69·36	2 +	64·55	1 +	3702·70	2 + br	80·0	5 + br
70·30	1 +	66·40	1 +	13·85	3 + br	4511·0	1 + br
72·11	3 +	82·30	10 r	40·4	1 +	13·00	5 + br
73·3	2 + br	92·89	15 r, d ¹⁾	72·25	1 +	29·7	10 + br
78·49	1	3138·9	1 +	75·20	1 +	65·0	1 + br
2433·62	1	3286·0	1 +	79·22	1	68·0	1 + br
59·8	1 + br	3301·98	1 +	81·4	1 + br	79·5	1 + br
75·1	1 + br	18·6	1 + br	82·40	1 +	90·0	1 + br
2568·11	3 r	36·2	1 + br	85·50	1 +	4663·55	5 +
75·22	3 r	3492·05	1 + br	88·8	1 + br	67·4	1 + br
75·52	1 r	3503·7	1 + br	91·92	1	73·0	1 + br
2631·83	4 +	05·1	1 + br, Ti?	3804·23	1	4701·5	1 + br
38·2	1 + br	27·33	1 +	10·16	1	03·2	1 + br
52·60	2	34·4	1 + br	3900·83	2	5696·71	10 +
60·50	3	35·7	1 + br	44·22	50 r	5722·80	5 +
69·23	1	39·3	1 + br	61·74	100	6234·0	1 + br
2816·41	20	61·9	1 + br	4371·0	1 +	45·3	2 + br
2927·9	1 + br	64·0	1 + br				

Kanten.

4470·73	K. R.	4648·42	K. R.	4842·40	K. R.	5143·15	K. R.
94·26	K. R.	72·21	K. R.	66·55	K. R.	5357·9	K. R.
4516·60	K. R.	94·80	K. R.	5079·53	K. R.	77·6	K. R.
37·80	K. R.	4716·70	K. R.	5102·37	K. R.	94·6	K. R.
57·80	K. R.	36·10	K. R.	23·60	K. R.	5410·0	K. R.
76·60	K. R.						

IV. As. Arsen.

Ältere Messungen: J. Herpertz, Zeitschr. für wiss. Phot. 4 (1906).

Material: Metall von E. Merck, mit Ni legiert (40% As).

Verunreinigungen: Sb.

Linienzahl: 69.

2134·37	1	2271·53	1 +	2381·32	2 +	2831·0	1 + br
56·3	1 +	88·28	3 +	2437·30	1	43·80	2 +
65·53	2 +	2350·02	10	56·62	4	60·60	8
92·21	2 +	63·10	1 +	93·07	4	98·86	2
2229·96	1	69·75	3	2745·10	5	2926·3	1 + br
66·82	1 +	70·87	3	80·37	10	59·8	3 + br

¹⁾ Als Verunreinigung in Nb als Doppellinie gemessen zu 3092·82 i = 2 und 92·95 i = 1.

2991·2	1 +	4188·00	2	4428	1 + br	4888·8
3032·97	1	97·8	1 + br	32	1 + br	4985·6
3116·7	2 + br	4203·1	1 + br	50·4	1 + br	5023·4
19·70	1 +	29·5	1 + br	59·5	2 + br	30·4
3256·0	2 +	4305·6	1 + br	66·6	1 + br	5105·9
3545·75	1 +	15·9	1 + br	74·7	1 + br	08·1
3922·60	100	68·50	2 +	79·5	1 + br	5231·9
31·4	1 + br	70·2	1 + br	95·4	3 + br	5331·6
48·85	1 + br	81·1	1 + br	4539·9	1 + br	5498·0
4037·18	30	97·3	1 + br	51	1 + br	5558·28
64·55	1 +	4415	1 + br	4855	1 + br	5651·40
82·8	1 + br					

V. Au. Gold.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der d. Wiss. Wien 63 (1896).

Material: Metall von C. Schuchardt.

Verunreinigungen: Ag, Cu, Pd, Ca.

Linienzahl: 370.

2110·85	2 +	2260·52	1	2322·39	2	2404·91
25·4	2	61·45	1 +	24·79	1	05·23
57·29	1	62·82	2 +	25·37	1 +	16·70
84·19	1	63·88	2 +	25·82	1	19·40
89·00	2	66·10	1 +	32·01	1 +	28·05
2201·45	3	77·55	1 +	34·2	1 + br	33·0
05·97	1	77·75	2 +	40·29	3 +	33·6
10·75	1	79·50	1 +	44·35	1 +	35·45
13·26	2	83·01	2	47·21	1	42·42
15·82	2 +	83·42	3	51·66	1	45·63
19·3	1 +	87·75	1 +	52·75	3	46·23
20·59	1	88·32	1	55·60	1	58·25
22·6	1 +	88·70	1	64·66	2	76·12
29·05	3 +	91·60	3 r	65·00	2 +	77·85
31·40	2 +	94·00	1 +	68·05	1 +	80·38
33·80	1 +	95·23	1	69·45	2 +	86·64
37·55	1 +	96·66	1	71·68	2 +	87·30
40·40	1 +	2301·15	1 +	73·26	1 +	90·45
42·80	3	04·90	4 +	76·32	2	91·6
45·61	1	08·32	1	82·50	1	92·71
46·52	1 +	09·52	2 +	84·26	1 +	98·93
46·73	2 +	11·06	1	87·86	3	2503·39
48·74	1 +	12·35	1 +	88·27	1	06·43
49·13	1 +	14·75	3 +	88·47	1 +	10·63
53·53	1	15·93	2 +	93·64	1	15·19
55·07	1 +	18·45	1 +	2401·63	1	28·20
56·01	1	20·37	1	02·82	1	33·78

¹⁾ Rote Komponente stärker.

2538.13	1 +	2833.75	1 +	3211.15	1	3609.75	1
44.34	2 r	35.56	1	22.15	1 +	14.20	3 + br
50.31	1 +	36.03	1	28.13	1	20.0	1 + br
51.99	1	38.14	5 +	30.79	3 +	20.5	1 + br
52.90	1 +	47.20	2 +	42.83	1	22.8	1 + br
62.70	1 +	52.65	1 +	43.50	1 +	23.6	1 + br
65.81	2	57.00	2 +	67.2	1 + br	23.9	1 + br
83.7	1 + br	64.65	1 +	70.3	1 + br	25.3	1 + br
90.19	2 r	83.56	3	73.83	1	27.4	1 + br
92.20	1	85.69	2	86.2	1 + br	32.7	1 + br
2602.15	1 + br	92.06	2 +	3308.46	2	33.40	4
09.59	1	93.52	2 +	10.04	1	35.28	2 +
10.3	1 + br, Mn?	2906.04	3 + r	18.7	1 +	37.5	1 + br
12.8	1 + br	07.18	4	20.35	1 +	42.5	1 + br
16.65	2 +	13.63	10	23.3	1 + Rh?	43.0	1 + br
17.54	1	18.51	2 +	24.9	1 +	49.3	2 + br
25.62	2	29.92	1	49.60	1 +	50.90	1 +
27.14	2	32.30	4 +	55.32	1	53.7	1 + br
28.14	1 Bi?	54.55	4 +	58.5	1 + br	54.2	1 + br
35.1	1 + br, Ba?	63.9	1 + br	61.38	1 Ti?	54.9	1 + br
41.60	4	82.23	2	73.02	1 +	75.0	1 + br
46.98	1 + Pt?	90.40	5	82.1	1 + br	81.6	1 + br
59.33	1	95.12	5 + r	93.7	1 + br	83.0	1 + br
65.23	1	98.06	1 Pt?	3404.05	1	86.15	1 + br
67.05	1	3014.3	1 + br	04.73	1	90.3	1 + br
76.04	20 d?	15.94	2	52.4	1 +	95.8	1 + br
87.72	3	29.30	5	70.45	1 +	98.6	1 + br
88.25	3	33.3	2 + br	93.10	1	3702.5	1 + br
88.80	3	64.81	1 Pt?	3517.05	1	07.0	2 + br
94.4	1 + br	66.85	1	23.50	1	08.2	1 +
2700.99	3	91.4	1 + br	28.2	1 + br	52.9	1 + br
02.50	1 Pt?	93.4	1 + br	39.2	1 + br	65.0	1 + br
03.46	1	3102.8	1 + br	41.7	1 + br	65.70	1
05.97	1	04.0	1 + br	48.2	1 + br	70.1	1 + br
32.10	2 + br	06.80	1	49.3	1 + br	73.30	1
33.05	1	17.0	1 + br	50.7	1 + br	80.1	1 + br
48.36	8	19.7	1 + br	51.1	1 + br	96.05	1 + br
48.9	1 + br	22.62	5	51.69	1	3804.14	6
51.10	1 +	22.92	8	53.71	3 +	16.4	1 + br
80.94	3	27.1	1 + br	55.60	1 +	22.1	2 + br
94.32	1 + Pt?	31.05	1 + br	57.3	1 + br	23.1	1 + br
95.65	1	33.15	1 + br	66.1	1 +	25.9	2 + br
2802.31	20	39.05	1	86.85	5 +	29.5	1 + br
05.42	2 +	45.65	1	92.1	1 + br	31.3	1 + br
20.08	8 +	46.50	1 +	94.35	1 +	36.65	1 +
22.81	4 +	56.70	2	98.23	1 +	45.1	1 + br
25.56	4	65.0	1 + br	3601.23	1 +	47.58	1 +
30.37	1	94.82	2 +	05.0	1 + br	53.75	2 + br
33.16	2 Pb?	3204.87	2 +	07.7	1 + br	54.95	1 + br

3855·8	1 + br	3916·1	1 +	4128·8	1 + br	4588·05	2 + br
59·5	1 + br	27·8	1 +	72 93	1 +	4607·72	2 r
63·8	1 +	59·29	2	4222·00	1 +	33·2	1 + br
69·75	1	76·75	1 +	42·00	2 +	37·5	1 + br
71·47	1	79·70	1 +	60·13	1 +	4760·40	2
74·83	3 +	4012·75	1 + br	4315·30	5 r	91·78	1
77·40	1 +	16·20	5	95·6	1 + br	92·81	10 r
80·37	1 +	20·81	1 +	4410·4	1 + br	4811·78	2
83·48	1 +	28·63	1 +	20·81	2	4902·44	1
84·4	1 +	41·10	2	37·47	3 r	5064·80	1
89·60	1 +	52·98	6	88·43	5 r	5145·4	1 + br
98·05	10 r	61·2	1 + br	4549·7	1 + br	5230·46	2 r
3907·80	1 +	65·22	10	59·0	1 + br	5656·0	1 + br
09·54	2	76·49	2	82·2	1 + br	5837·64	1
14·4	1 +	83·42	1	83·9	1 + br	6278·40	1
14·9	1 +	84·29	2				

VI. Ba. Baryum.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. d. K. Akad. der Wiss. in Wien 118, II a. (1909) (Rot).

Material: Ultraviolett, Baryumnitrat auf Kohle. Sichtbar, Baryumbromid auf Kohle.

Verunreinigungen: Ca, Sr.

Linienzahl: 148.

2245·76	1 +	2634·96	10 r	3163·42	1 +	3649·38	1 +
54·89	2 +	41·55	1 +	95·31	1 +	62·7	1 + br
80·91	1 +	47·42	2 + r	3235·0	1 +	3889·52	2
2304·33	15 n	82·03	1	67·00	1 +	92·42	500 r
23·69	1	2702·7	1 + br	69·8	1 + br	3910·15	10 r
31·30	2	31·55	1 +	81·6	1 + br	26·98	2 +
35·39	20 n	46·2	1 + br	86·90	1 +	36·00	10 r
47·70	10	71·52	3 + r	3332·2	1 + br	38·11	2
73·22	1 +	2939·03	1 +	49·5	1 + br, Ti?	93·60	20
2418·20	1 +	60·10	1 +	68·32	3 +	95·85	2
76·92	1	62·58	1 +	69·85	1 +	4130·91	800 u ¹⁾
2505·26	1	3014·45	1 +	3501·26	5	66·29	100 r
10·3	1 +	43·48	1 +	25·3	1 + br	4224·15	1 +
20·24	1	71·75	3 +	45·0	1 + br	40·0	1 + br
24·00	1	79·20	2	77·77	1 +	42·9	2 + br
28·60	5 r	80·00	1 +	79·94	2 +	64·5	1 + br
31·15	1	3104·00	1 +	86·68	1 + Mn?	83·39	20 r
59·71	2	19·26	1	99·7	1 +	91·35	2 +
70·9	1 + br	52·76	1 +	3630·83	2 +	4305·45	1 +

¹⁾ Rote Komponente stärker.

4323·0	1 + br	4589·9	1 + br	4947·50	1 +	5826·52	10
25·38	1 +	92·0	1 + br	59·5	1 + br	54·00	100
32·8	1 + br	99·92	2	5055·0	1 + br	5907·88	2
50·70	5 + r	4605·1	1 + br	5160·15	1 + br	71·93	10
59·83	1 + Cr?	20·15	1 +	64·4	1 + br	97·38	10
4402·70	10	28·40	1 + br	75·8	1 + br	6019·74	10
07·03	1	73·76	2 +	77·4	1 + br	63·40	15
13·86	1 +	91·80	4	5267·15	1 + br	6111·10	20
32·03	8	4700·68	1 +	5303·2	1 + br	42·00	500 u
67·34	1 +	24·97	1 +	04·3	1 + br	6341·90	15
89·15	2 + br, v(Fe)	26·63	5	06·0	1 + br	6451·10	8
93·75	2 + br	74·1	1 + br	5424·81	3	83·19	10
4506·09	5	4846	1 + br	5519·30	10	97·20	200 u
23·42	2 +	66·7	1 + br	35·78	30	99·10	10
25·20	50 + r	67·7	1 + br	5680·5	1 + br	6527·59	10
54·21	1000 u	77·8	1 + br	5777·90	20	95·60	5
74·02	5	4900·19	100 r ¹⁾	5800·53	3	6675·56	2
79·79	10	34·31	300 u	05·93	2	94·12	2

VII. Be. Beryllium.

Ältere Messungen: Fehlen.

Material: Berylliumnitrat auf Kohle.

Verunreinigungen: Keine.

Linienzahl: 10.

2348·58	1	2650·71	8 u	3321·23	3	4572·87	5 r
48·72	3	3130·56	20 u	21·51	3	4673·1	1 + br
2494·75	6 u	31·20	15				

Kanten.

4708·89	K. R.
32·85	K. R.

VIII. Bi. Wismut.

Ältere Messungen: W. Schwetz, Zeitschr. für wiss. Phot. 8 (1910).

J. M. Eder und E. Valenta, Sitzber. der K. Akad. der Wiss. in Wien

118, II a. (1909) (Rot).

Material: Metall von C. Schuchardt.

Verunreinigungen: Ag, Ca, Cd, Cu, Pb, Sb, Sn.

Linienzahl: 121.

¹⁾ Daneben eine verwaschene Linie auf 4900·8?

2143·65	1 +	2696·98	5	3431·15	20 +	4308·40	3
44·58	1	2714	2 + br	51·20	20 +	08·74	3
87·05	2	30·53	3	55	1 + br	28·8	5 + br
2202·8	1 + br	30·71	4	74·0	5 + br	40·7	5 + br
14·15	1	46·45	1 +	85·7	5 + br	91·7	2 + br
28·30	3 u ¹⁾	80·68	8 r	3511·00	20	4477·3	2 + br
30·68	4 u	98·8	1 +	28·0	1 + br	92·80	1 +
46·53	1	2803·59	4	41·5	2 + br	93·15	1 +
65·11	3 (Cd)	03·80	5	96·35	20 r	4561·33	50
76·63	3 u	09·78	3 +	3613·9	5 + br, r	4705·5	3 + br
2313·10	1 +	47·7	1 + br	54·5	1 + br	22·61	20
68·30	2	55·79	30	95·70	50 +	22·81	20
68·48	2	98·12	50 u ¹⁾	3756·5	2 + br	30·2	2 + br
68·65	2	2938·40	100 u ¹⁾	93·0	50 + br	50·8	2 + br, d ¹⁾
94·0	1 +	89·10	20 u ¹⁾	3811·4	2 + br	52·3	2 + br
2400·97	15	93·39	10	16·3	4 + br	97·60	10 +
02·08	1 +	3024·77	30 u ¹⁾	46·2	2 + br	4908·0	1 + br
14·88	20	35·10	3 + r	49·2	1 + br	93·6	2 +
46·3	1 + br	39·2	1 + br	64·4	10 + br	5079·6	3 +
89	2 + br	39·8	1 + br	88·10	1 +	5124·5	10 +
99·60	1 +	67·78	200 u	88·39	1 +	44·7	20 +
2515·79	1 +	76·75	4	4079·40	30 +	5202·5	2 + br
24·67	3 +	3111·5	1 + br	4121·75	5	09·45	30 +
33	1 + br	15·5	2 + br	22·08	6	70·2	2 +
44·5	1 + br	3296	1 + br	4220·65	1 +	70·6	2 +
82·3	1 + br	99·8	1 + br	54·4	1 + br	71·2	2 +
2613·77	1	3393·2	1 + br	59·85	100 + br	5656·0	1 + br
28·17	30	94·2	1 + br	72·6	5 + r	5718·8	1 +
53·20	1 +	97·41	20 r	75·3	1 + br	19·2	1 +
96·80	4	3405·4	1 + br	4302·25	50 + br	19·9	1 +

IX. Bo. Bor.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der k. Akad. in Wien. 60 (1893).

Material: Borsäure auf Kohle.

Verunreinigungen: Keine.

Linienzahl: 3.

2496·87	10 u ¹⁾
97·79	20 u ¹⁾
3451·49	20

¹⁾ Rote Komponente stärker.

X. Br. Brom.

Ältere Messungen: A. de Gramont, Ann. chim. phys., 10 (1896)

J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in

Wien, 68 (1899) (Geißlerrohr).

Material: Bromkalium auf Gaskohle.

Verunreinigungen: Keine.

Linienzahl: 153.

2386.9	2 + br	2952.2	1 + br	3253.0	1 + br	3693.65	3 +
89.2	1 + br	61.3	1 + br	60.9	1 + br	3840.00	1 + br
89.9	2 + br	67.2	2 + br	61.8	1 + br	92.2	1 + br
92.5	1 + br	69.20	4 +	67.2	1 + br	3904.1	1 + br
2488.7	1 + br	72.3	3 + br	70.25	2 +	15.3	1 + br
2521.90	2 +	76.0	1 + br	80.75	1 + br	25.0	2 + br
41.6	2 + br	82.1	1 + br	82.3	2 + br	40	2 + br
57.0	2 + br	83.8	1 + br	91.2	2 + br	51.3	1 + br
79.5	1 + br	85.0	1 + br	96.55	1 +	81.0	3 + br
89.6	1 + br	94.35	3 +	3301.4	2 + br	86.6	1 + br
93.9	2 + br	3016.4	1 + br	21.17	2 +	4140.3	1 + br
2606.8	1 + br	20.95	4 +	30.0	1 + br	79.65	1 +
13.7	1 + br	33.85	1 +	33.20	5 +	93.6	1 + br
27.1	1 + br	36.60	1 +	49.95	3 +	4224.0	3 + br
60.7	1 + br	47.2	1 + br	71.2	1 + br	25.75	1 +
90.4	1 + br	56.2	1 + br	97.20	3 +	91.4	2 + br
2714.0	1 + br	57.8	1 + br	98.1	1 + br	4365.80	4 +
19.2	1 + br	59.3	1 + br	3402.70	3 +	4512.7	1 + br
46.5	1 + br	68.3	1 + br	14.55	3 +	38.8	1 + br
66.9	2 + br	74.55	4 +	16.5	1 + br	43.0	2 + br
70.7	1 + br	92.0	1 + br	17.75	3 +	4622.80	3 +
2807.6	1 + br	3116.1	2 + br	34.1	1 + br	52.3	1 + br
43.1	1 + br	17.55	2 +	40.8	1 + br	72.6	1 + br
46.2	1 + br	29.8	1 + br	77.2	1 + br	78.70	8 +
67.1	1 + br	30.4	1 + br	88.0	1 + br	93.30	3 +
72.7	2 + br	47.95	2 +	3506.60	5 +	4704.90	20 +
75.6	1 + br	49.7	1 + br	17.50	5 +	19.80	3 +
84.0	1 + br	62.9	2 + br	29.0	3 + br	42.75	3 +
92.3	2 + br	65.7	1 + br	40.30	8 +	67.10	3 +
2901.30	1 + br	67.7	3 + br	51.15	3 +	76.5	2 + br
02.00	1 + br	74.3	2 + br	62.50	10 +	85.45	10 +
07.8	1 + br	85.4	1 + br	68.9	1 + br	4816.69	8 +
10.8	1 + br	98.9	2 + br	91.55	1 +	49.8	1 + br
17.4	1 + br	99.8	1 + br	3600.80	3 +	4928.8	1 + br
22.1	1 + br	3203.1	1 + br	12.6	1 + br	30.6	1 + br
27.10	5 +	14.6	1 + br	22	1 + br	5182.45	3 +
28.95	1 +	21.2	2 + br	60.0	2 + br	5238.4	2 + br
35.4	1 + br	38.0	2 + br	69.5	1 + br	5332.25	2 + br
35.9	1 + br						

XI. C. Kohlenstoff.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 60 (1893). H. Deslandres C. R., 120 (1895). A. de Gramont C. R., 125 (1897).

Material: Gaskohle, Sibirischer Graphit, Carbone sublimé von Prof. H. Moissan.

Verunreinigungen: Al, Ba, Bo, Ca, Cu, Fe, Mg, Mn, Si, Ti.

Linienzahl: 28.

2296·96	5	2837·80	2 +	4395·35	1 + br	4772·0	1 + br
2478·71	20	2968·0	1 + br	4411·0	2 + br	5133·4	1 + br
2509·20	3	93·5	1 + br	33	2 + br	43·6	1 + br
12·16	4	3165·65	1 +	81·2	1 + br	45·4	1 + br
2641·3	1 + br	3921·6	3 + br	4530·3	1 + br, C?	51·3	1 + br
2747·2	1 + br	4267·1	10 + br	4667·45	1 +	6578·20	3 +
2836·90	4 +	4373·5	2 + br	73·9	1 + br	83·05	2 +

Kanten.

3584·03	K. V.	4158·18	K. V.	4514·95	K. V.	4697·59	K. V.
85·97	K. V.	67·79	K. V.	32·03	K. V.	4715·20	K. V.
90·49	K. V.	81·00	K. V.	53·30	K. V.	37·02	K. V.
3861·70	K. V.	97·23	K. V.	78·16	K. V.	5129·30	K. V.
61·86	K. V.	4216·13	K. V.	4606·28	K. V.	65·30	K. V.
71·51	K. V.	4502·28	K. V.	85·00	K. V.	5635·04	K. V.
83·50	K. V.						

XII. Ca. Calcium.

Ältere Messungen: J. M. Eder und E. Valenta, Wien. Anz. (1892) Denkschr. der K. Akad. der Wiss. in Wien, 67 (1898). Sitzber. der K. Akad. der Wiss. in Wien, 118, II a (1909). F. L. Cooper, Astroph Journ., 29 (1909).

Material: Calciumchlorid auf Gaskohle.

Verunreinigungen: Ba, Na, Sr.

Linienzahl: 84.

2208·9	1 + br	2999·75	1	3179·51	50 u ¹⁾	3630·86	3 +
2373·27	1 +	3000·97	2	81·60	10 r	44·53	4 +
98·66	1 u ¹⁾	06·94	3	3487·88	1 +	3706·30	50 r
2995·06	2	09·30	2	3602·2	1 + br	37·35	50 r
97·42	2	3159·06	50 u ¹⁾	24·20	2 +	3933·81	1000 u

¹⁾ Rote Komponente stärker.

3949.00	1 +	4355.6	1 - br, r	5041.89	2	5603.08	3
57.22	2 +	4425.62	20	5189.00	4	5857.70	4
68.62	500 u	35.20	20	5260.63	1 +	6102.98	3
73.95	2	35.88	15	61.87	3	22.50	8
4093.0	1 + r	55.01	30 u	62.40	3	61.62	1 +
95.3	2 + r	56.12	15	64.41	3	62.43	10
99.0	2 + r	56.80	5	65.72	5	64.07	1 +
4132.7	1 +	4527.22	2 - br, r	70.43	10	66.71	1
4226.89	100 u	78.71	4	5349.62	5	69.33	2
40.57	1 +	81.62	5	5513.19	2	69.83	2
83.17	20	86.03	8	82.19	3	6439.35	5
89.50	20	4685.35	1 - br	89.00	10	50.08	2
99.13	20	4703.35	1 - br	90.31	3	62.82	5
4302.68	50	40.4	1 - br	94.70	8	71.94	2
07.92	20	4812.07	1	98.67	8	94.08	3
18.81	30	78.35	8	5601.49	3	99.94	1

XIII. Cd. Cadmium.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 61 (1894) und Sitzber. der K. Akad. der Wiss. in Wien, 118, IIa (1909).

Material: Metall von E. Merck.

Verunreinigungen: C, Ca, Cu, Fe, Pb.

Linienzahl: 129.

2111.69	2	2418.78	2	2881.0	3 - br	3089.3	1 +
44.50	4 u	26.45	1	2911.0	1 - br	92.45	1 +
55.1	1 +	69.85	3	48.3	1 - br	95.70	3 -
68.6	1 - br	88.04	2	52.0	1 - br	3113.05	1 -
87.89	1	95.75	1	71.4	1 - br	19.0	2 - br
94.70	4 u	99.96	2	80.8	3 - br	21.95	2 -
2204.4	1 +	2552.3	1 - br	87.4	1 -	24.55	2 -
09.8	1 -	73.18	30	96.25	1 - br	29.37	3 -
24.51	2	2618.91	1	3009.1	1 - br	33.50	3 -
39.91	3	39.7	1 - br	14.5	1 - br	54.3	1 - br
48.93	1 +	68.3	1 -	17.5	1 - br	57.19	2 -
65.11	10 u	77.9	1 - br	35.85	1 -	61.0	1 - br
67.51	2	2707.13	1	49.0	2 -	61.99	3 -
88.09	10 u	27.2	1 - br	53.3	1 - br	73.70	2 -
2306.72	3	48.85	50	59.4	1 - br	74.56	2 -
12.90	20 u	67.11	1	65.2	2 - br	76.9	1 - br
21.25	10	75.3	1 - br	69.2	1 - br	78.68	1 -
29.36	8	2805.73	1	77.3	1 - br	85.68	3 -
75.0	1 - br	34.25	1 -	81.1	2 - r	97.9	1 - br
76.91	1	37.2	2 - br	85.10	3 -	3210.2	2 - br
2418.33	1	68.5	1 - br	88.55	1 -	17.9	2 - br

3221·67	1 +	3500·3	1 + br	4095·0	2 + br	5338·4	2 + br
36·85	1 +	35·83	4	4114·8	1 + br	79·0	3 + br
50·51	10	3610·61	100 u ¹⁾	27·4	1 + br	5497·6	50 + br
52·8	3 + r	12·99	15	58·3	1 + br	5674·1	1 + br
61·21	5	14·60	2	4307·1	1 + br, r	5736·9	1 + br
64·6	1 + br	3940·6	1 + br	4413·21	2	61·78	1 +
83·98	2 +	59·2	2 + br	15·89	20	62·7	1 + br
86·15	1 +	77·3	2 + br	4662·75	2 + r	6325·4	1 + br
3385·6	1 + br	85·0	1 + br	78·42	50	6439·1	200 + br, r
3403·72	30	88·3	1 + br	4800·35	100 +	64·8	1 + br
66·34	30 u ¹⁾	92·0	1 + br	5086·10	50 r	69	1 + br
67·77	15						

XIV. Ce. Cer.

Ältere Messungen: O. Lohse, Ber. der Berl. Akad. (1897) (λ 4000 bis λ 4700).

Material: Cerammonnitrat von L. Haitinger, auf Gaskohle.

Verunreinigungen: La, Nd, Pr.

Linienzahl: 1758.

2180·74	1	2477·40	1 +	3055·71	4	3171·80	1 La?
2222·14	1	79·57	1	56·66	2 +	83·70	1
25·20	2	83·95	1	57·32	2 +	86·33	1
27·96	2	97·62	1	57·71	2 +	94·98	1
28·13	1	2532·11	1	63·14	2	3201·90	1
42·40	1	48·88	1 +	84·56	1	19·11	1
65·00	1	78·40	1 +	85·19	2	21·35	1
87·91	1	2603·72	3	3103·52	1	27·26	1
2300·74	1	35·3	1 +	07·10	1	28·72	1
02·20	1	49·49	1 +	07·62	1	31·43	1
17·46	1	51·12	1	10·65	2	34·35	1
18·77	2	62·95	1	11·22	1	35·10	1 +
24·48	1	73·00	1	21·68	3	36·90	1
37·80	1 +	2730·16	1	30·5	1 +	43·55	1
50·24	2	43·84	1	31·05	1	52·63	1
62·70	1 +	49·02	1	33·47	1 +	61·2	2 +
67·90	1 +	68·48	1	41·36	2	72·42	2
72·46	2	2849·45	1	44·06	2	75·01	1
77·25	1	2931·67	1	44·68	1 +	80·00	1
77·61	1	77·02	1	45·38	1 +	85·39	1
80·29	2	95·77	1	46·50	1 +	95·48	1
2431·60	2	3017·29	1	47·15	2	97·05	1
39·40	1	22·81	1	55·88	1 +	3300·33	1
54·46	1	31·71	3	64·37	1 +	05·03	1
70·05	2	52·15	1 +	69·37	1	12·35	1

¹⁾ Violette Komponente stärker.

3317.48	1 +	3465.08	1	3533.75	1 +	3594.2	1 +
25.42	1	67.98	1	34.21	2	94.75	1 +
34.58	1	68.26	1	34.60	1	96.27	1
42.01	1	71.05	5	35.73	1 +	98.36	1
44.00	1	74.41	1	36.84	1 +	3600.16	1
44.91	2	77.01	2	37.3	1 +	00.76	1
53.41	3	80.49	1 +	37.6	1 +	03.50	1
57.36	1	81.16	1 +	38.95	1	04.36	1
60.69	1	81.34	1 +	39.23	2	07.80	2
61.97	1 +	82.31	1 +	43.43	1	09.84	3
66.70	1	82.53	1	44.17	3	11.12	1
68.90	1	84.93	1	45.79	1	11.51	1
71.33	1	85.21	2	45.93	1	12.50	1
73.60	1	88.69	1	46.35	1	13.86	2
73.87	1	90.29	1	46.82	1	16.35	1 + d?
75.90	1	93.3	1 +	47.17	1	18.71	1
77.31	2	94.0	1 +	48.98	1	21.30	1
79.33	1	96.12	1	49.2	1 +	22.30	2
81.66	1	96.51	1 +	51.56	1 +	22.50	1 +
83.65	1	97.92	2 +	51.82	1 +	23.96	3
94.20	1 u	3500.89	1 +	52.88	1	28.40	1
95.88	1 +	01.64	1	54.79	1	30.59	1
99.1	1 +	03.20	1 +	55.15	2	31.35	1
3405.1	1 +	04.75	3	55.25	1 +	32.24	1
06.10	1	08.10	1	57.05	1 +	32.4	1 +
07.37	1	08.62	1	60.99	4 r	37.93	1
16.72	1	08.86	1	61.3	1 +	38.44	1
17.00	1	10.9	1 +	63.95	1	40.9	1 +
17.58	1	11.75	1	68.28	1	41.75	1 +
20.35	1	13.98	1	69.44	1	41.9	1 +
22.85	2	15.9	1 + br	72.57	1	43.0	1 +
24.02	1 +	17.52	2	73.86	1 +	44.45	1
26.32	1	18.50	1	75.4	1 +	45.40	1
27.45	2 +	19.19	1	76.40	1	45.61	1
30.44	1 +	19.90	1 +	77.61	4 r	46.80	1
31.15	1 +	20.67	1	78.88	1	47.13	2
33.22	1	22.01	2	80.75	1 +	48.13	2
39.95	1	24.18	1	80.95	1 +	49.90	1
40.73	1	26.83	1	83.83	1	50.31	1
41.35	1	27.96	1	84.49	1	51.04	2
42.54	1	28.18	1	84.91	1	51.82	1
43.76	3	28.75	1	86.00	1	52.27	1
51.80	1	29.2	1 +	86.90	1	52.40	1
54.52	4	29.4	1 +	87.37	1	53.27	2
56.92	1	30.17	1	87.80	2	53.83	2
59.52	4	31.07	1	88.27	1	55.06	1
63.41	1	31.74	1	88.61	2	56.00	3
63.91	1	32.74	1	90.49	1	56.9	1 +
64.32	1	33.00	1	90.77	2	58.4	1 +

3659.40	2	3702.97	1	3746.25	1	3777.80	1
60.13	2	05.17	2	46.54	2	77.98	1
60.30	2	07.13	1	48.23	3	78.90	1
60.82	2	07.57	1	50.27	2	79.9	1
61.90	1	07.81	1	51.18	1	80.66	1
62.08	1	09.48	3 r	51.60	2	81.30	1
63.15	1	10.13	3	52.51	2 +	81.80	3
63.85	1	14.15	1	53.27	1 +	82.70	3
64.90	1	14.95	1	53.95	1	83.19	1
65.17	1 +	15.30	1	54.43	1	83.70	2
65.70	1 +	15.64	1	54.66	1	84.0	1
67.44	1	16.53	3	55.57	2	84.5	1
68.15	3	17.08	1	55.86	2	85.5	1
68.89	1	17.65	1	56.44	1	85.65	1
70.70	1	18.35	2	57.86	2	86.81	3
70.80	1	18.56	3	58.01	1	87.33	2
72.12	1	19.98	1	58.67	1	87.68	1
72.36	1	20.08	1	59.33	1 + d(La)?	88.06	1
72.96	2	22.30	1	60.55	1 +	88.36	1
73.83	1	22.47	1	60.88	1	88.65	1
74.30	1	22.95	1	62.47	1 +	88.93	3
75.55	1 +	24.83	1	63.14	3	90.1	1
76.31	1	25.85	2	63.80	1	90.6	1
77.3	1 +	26.63	1	64.32	3 r	91.0	1
79.00	1	27.14	1	64.78	1	91.85	1
79.31	1	27.55	1	65.19	2	92.50	2
79.58	2	28.17	2	66.05	1	93.0	1
80.27	1	28.30	1	66.65	1	93.65	1
81.02	1	28.61	3 r	66.8	1 +	93.95	1
81.55	1	29.2	1 +	68.15	1 +	94.51	1
82.25	1	30.12	1	68.43	1 +	94.85	1
82.83	1	30.54	1	68.92	2	95.44	1
84.4	1 +	31.4	1 +	69.20	1	95.95	1
85.3	1 + br	32.06	1	70.11	2	96.31	1
86.45	1 +	32.75	1	70.93	2	96.83	1
87.96	1	33.70	1	71.75	2	97.05	1
88.81	1	35.05	1	71.85	1 +	98.05	1
89.33	1	36.65	1 +	72.30	1 +	99.2	1
93.59	1	37.30	1 Fe?	72.80	1	99.35	1
93.90	1	37.75	1 +	73.05	1	3800.20	1
95.07	1	37.89	2	73.37	1	00.47	1
96.15	1	39.90	1 +	73.64	1	01.71	1
96.25	1	40.31	1	74.23	1	02.92	1
97.84	1	41.19	1	74.72	1	03.25	1
98.28	1	41.58	1	75.4	1 +	04.05	1
98.53	1	41.95	1 d	76.15	1 +	04.30	1
98.84	1	44.22	1	76.30	1	04.87	1
99.35	1	44.87	1	76.75	2	05.65	1
3700.07	1	45.75	1	77.20	1	06.30	1

3807.00	1	3834.90	1	3865.27	1	3891.95	1
07.85	2	35.30	1 La ?	66.15	1	93.40	1
08.25	3 _r	35.49	1	66.32	1 +	94.02	1
08.83	1	35.95	1 + d	66.63	1 +	94.46	1
09.36	2	36.25	2	66.98	1	95.29	2
09.63	1	36.65	2	67.15	1 +	96.98	3
09.87	1	37.33	1	67.80	1	97.56	1
10.28	1	37.50	1	67.95	1	98.42	2
10.42	1	37.77	1	68.29	2	99.09	1
10.7	1 +	38.01	1	68.69	2	99.52	1
11.09	1	38.71	3	68.95	1 +	3900.35	1
11.50	1	39.64	1	69.27	1 +	01.47	1
11.77	1	42.15	1 +	69.54	1	01.85	1
12.2	1 +	43.13	2	69.78	1	03.40	2
12.38	2	43.57	1	71.03	2	04.09	1
13.47	1 +	43.92	1	71.57	2	04.50	2
13.7	1 +	44.15	1 Cy ?	72.00	1	04.72	1 +
14.69	2	45.17	1	73.16	1	05.45	1
15.02	1	45.50	1 +	73.45	1	07.10	1
15.12	1	45.60	2	73.72	1	07.45	2
17.17	1 +	46.12	1	74.50	1	07.55	2 _r
17.57	2	46.65	1	74.89	2	08.65	2
17.80	1 +	46.75	1	75.21	2	08.90	1
18.40	1	48.25	1	75.50	2 +	09.20	1
18.84	1	48.73	2	76.27	1	09.47	1
19.17	2	49.77	1	76.60	1 +	09.90	1
19.37	2	49.87	1	77.15	2	10.08	1
21.00	2	50.30	2	77.63	1	10.82	1
21.43	2	51.47	1	78.53	2	11.45	1
21.90	2	51.75	1 +	79.22	1	12.34	1
22.45	1	52.31	1	79.80	1	12.60	3
23.2	1 +	52.57	2	80.55	2	14.12	1
24.02	3	53.32	2	81.83	2	14.27	1
24.95	1 +	53.63	1 +	82.07	2	15.09	1
25.80	1	54.35	3	82.60	3	15.66	2
27.07	1	54.48	3	83.50	3	16.27	2
27.52	2	54.7	1 + br	83.68	2 +	17.01	1
29.58	2	55.45	2	84.34	1	17.36	1
29.82	2	57.15	2	84.88	1	17.75	2
30.17	2	57.40	2	85.90	1	18.40	3
30.76	2	57.83	2	86.43	1	19.94	3
31.21	3	58.07	2	86.65	1	21.90	3
31.9	2 + br	60.38	1	89.14	1	23.25	3
32.40	1	60.59	1	89.43	1	24.78	2
32.60	1	62.65	2	89.61	1	24.95	1
32.86	1	63.12	1	90.20	3 _r	26.4	1 + d
33.20	1	64.23	1	90.67	1	27.12	1
33.95	1	64.47	1	90.91	1	27.50	1
34.70	2	64.71	1	91.16	1	27.70	1

3928.42	1	3959.01	2	4001.90	2	4048.53	1
28.96	1	59.85	1	03.01	2	49.20	1
29.22	1	59.97	1	03.10	1	49.30	1
30.10	1	60.55	1	03.35	1	49.98	1
30.93	1	61.08	3	03.95	4 r	51.00	2
31.21	2	61.71	2	04.73	1	51.60	2
31.50	2	62.23	2	05.80	2	52.20	3
31.96	2	63.55	1	07.85	2	53.25	1
32.31	2	64.33	2	08.63	1 +	53.70	4
33.15	1	64.66	2	08.82	1	55.13	3
34.89	1	67.09	2	09.25	1	55.35	1 +
35.4	1 +	67.33	2	10.30	2	56.00	1 +
35.68	1 +	67.70	1	11.75	1	56.50	1 +
36.05	1	70.19	2	12.58	10	57.07	2
37.30	1	70.59	1	15.05	4	58.44	1
37.84	1	70.80	1	16.02	2	58.95	1
37.93	1	72.21	2	16.2	1 +	59.55	1 +
38.23	2	73.2	1 + br	17.73	2 +	60.67	2
38.75	1	74.1	1 + br	19.20	2	60.93	1
39.70	1	74.35	1	19.64	1	61.63	1
39.80	1	74.67	1	20.05	2	62.41	4
40.49	3	75.69	2	20.71	1	63.15	3
40.8	1 +	76.19	1	22.44	2	64.13	1
41.14	2	76.90	1	23.55	1	65.07	1
42.35	4	77.68	1	23.80	1	65.35	2
42.90	5	77.92	2	24.67	5	66.70	2
43.30	1	78.80	3	25.31	2	67.45	3
43.64	1	80.11	1	26.02	1	67.92	1
44.05	3 r	81.05	3 r	27.16	1 +	68.64	2
45.04	2	82.07	1	27.85	3 +	69.01	3
46.33	1 +	83.06	3	28.0	2 +	70.30	3 -
46.85	1	83.44	3	28.55	4 r	71.03	1
48.14	2	84.82	3 r	29.38	1	71.29	1
49.08	1 +	86.55	1	30.35	1 +	71.95	3
49.98	1	89.58	3	30.50	2	73.10	2
50.62	1	90.26	1 Nd?	31.48	4 r	73.61	4
51.01	1	90.85	1	32.7	1 +	73.95	3 +
51.61	1	91.45	1	37.55	1	74.80	1
51.80	1	92.30	1	37.82	2	75.85	3
52.28	1	92.52	3	38.40	2	76.01	3
52.75	8 r	93.05	2	40.05	1	76.41	2
53.81	2	93.99	4	40.91	8	77.00	1
54.12	1	96.6	1 +	41.45	1	77.60	2
55.51	2	96.9	1 +	42.32	1	78.45	3
56.1	1 + d	97.86	2	42.73	5	78.72	3
56.44	3	99.40	6	43.6	1 +	79.16	1
57.05	1	4000.90	1 d	45.40	4	79.45	1
58.12	2	01.23	1	46.51	4 r	79.85	2
58.40	2	01.68	2	47.46	1	80.65	3

4081.40	4	4124.01	5 r	4165.75	10	4215.7	1 + Sr?
82.30	1	24.92	4	66.37	1	17.71	3 La?
83.40	5	25.57	1	66.85	1	19.9	1 +
83.8	3 +	25.95	1	67.03	5	20.75	1 +
84.82	1	26.80	1	67.96	3	20.93	1 +
85.41	3	27.06	1 +	70.00	5	21.33	1
85.92	1	27.51	4	71.2	1 +	22.80	5 r
86.61	2	27.92	2	71.56	1	24.07	1
87.47	2	28.23	2	72.31	1	24.73	1
87.70	2	28.53	3	74.61	1	27.93	4
88.75	1	29.30	2	75.40	1	28.46	1
89.05	2 + r	30.84	4	76.22	1	30.35	1 +
89.91	2 +	31.26	4	76.83	3	30.7	1 +
90.65	2	31.99	1	79.27	1	31.94	2
91.13	2	32.45	1	79.45	1	32.20	1
92.00	1	32.80	1	81.25	3	32.75	1
92.25	1	33.98	10	82.5	1 +	33.38	1
92.89	2	35.60	3	85.51	3	34.39	2
94.11	2	36.05	2	86.71	10	34.92	1
96.00	1	37.00	2 +	87.49	3	36.17	1
99.14	2	37.78	10	89.33	1	36.51	1
99.54	1	38.25	2	89.79	1 +	37.36	1 +
99.89	2	38.51	2	90.79	2	40.09	5
4101.92	5	39.60	1	91.20	2	41.60	1
02.54	2	39.99	1	91.50	1 +	42.20	1
04.60	1	40.7	1 +	93.21	4	42.90	3
05.15	4	40.95	1 +	93.45	4	43.90	1
06.33	2	42.59	5	94.02	3	46.09	5
07.03	3	42.98	2	95.04	3	46.56	1
07.60	4	44.66	3	95.98	1	46.86	3
07.95	1	45.19	8	96.48	4	47.63	1
08.39	1	46.40	4	97.75	1	48.27	1
08.90	1 +	48.34	2	97.83	1	48.81	6
09.70	1	49.06	3	98.15	2	51.79	1
10.52	3	50.09	10	98.58	1	52.03	1
11.02	1	51.09	3	98.85	6	53.54	2
11.54	3	52.19	10	4201.45	4	54.98	1
13.89	2	53.10	1	03.10	5	55.10	1
14.29	2	53.30	1	03.69	1	55.94	3
15.52	5	54.09	1	04.90	1	56.32	2
17.14	3	55.45	1 +	05.32	1	57.30	1
17.45	2	55.69	2	06.03	1	58.54	1
17.75	2	59.20	4	06.99	1	59.93	1
18.30	6	60.35	2	08.42	1 +	61.33	1
19.15	3	61.34	2	08.58	1 +	63.59	2
20.00	8	62.0	1 +	09.59	2	64.14	1
21.00	3	62.1	1 +	10.20	1	64.55	1
21.76	1	62.79	2	13.22	1	64.87	1
23.65	3	63.70	4	14.20	2	67.45	1 +

4678·18	1	4742·48	1 +	4812·70	1 +	5208·61	1
78·80	1 +	42·65	1	14·82	1 +	34·15	1 + br
80·30	2	45·11	2	18·50	1 +	37·25	1 + br
80·63	1	47·30	2	18·73	1 +	52·87	1 +
81·19	1	48·41	1 +	20·21	1	65·85	2
83·25	1	49·40	1 +	21·25	1 +	74·40	3
84·79	3	49·69	1 +	22·30	1	75·95	1 + br
85·40	1	51·74	1	22·73	1	5330·75	2
86·95	2	52·48	1	35·81	1 +	48·0	1 + br
87·79	1	53·84	1	36·85	1	53·71	5
89·07	1	55·69	1	38·7	1 + br	59·70	1
89·65	1	56·30	1 +	39·80	1 +	78·52	1 +
90·35	1	58·05	2	45·70	1	86·96	1
90·70	1	58·70	1 +	46·74	1	93·62	3
92·23	1	60·10	1	48·00	2	5409·47	3
94·57	1	64·11	1	50·09	1	18·05	1 +
95·07	1	64·25	1 +	50·40	1 +	41·98	1 +
96·73	1 +	64·95	1	50·90	1 +	49·50	1
96·96	1	65·46	1	51·05	1 +	51·45	1 +
4701·62	1	66·05	1	58·90	1	58·33	1
02·18	1	68·38	1	59·71	1 +	59·40	1
02·89	1	68·96	2	65·30	1 +	60·26	1
04·18	1	74·11	3	66·55	1 +	64·41	1
06·00	1 +	75·00	1 +	74·13	1	68·57	3
06·61	1 +	75·65	1	82·61	3	72·48	3
07·19	1 +	75·96	1	91·44	1 +	81·52	1
07·40	1 +	76·47	1 +	92·00	1 +	85·06	1 +
08·10	1	77·05	1 +	94·10	2	5509·70	1
10·16	1	77·40	1 +	4915·10	1	12·29	3
12·61	1	80·41	1 +	43·60	1	13·35	1 +
14·18	3	81·97	1 +	44·76	1	16·30	1
15·00	2	82·40	1 +	49·64	1 +	18·71	2
18·05	2	84·15	1	71·68	2	20·42	1
18·61	1	84·99	1 +	94·8	1 + br	22·05	1
19·67	1 +	87·35	1 +	5002·95	1	24·70	1 + br
22·48	1	88·47	1 +	11·93	1	27·05	1
22·93	1 +	93·35	1	23·03	1	35·45	1 +
23·50	1	93·51	1	37·9	1 + br	37·50	1 +
24·50	1 +	95·39	1	44·20	1	49·00	1 +
25·26	2	95·75	1	67·30	1 +	50·26	1
27·02	1 +	97·55	1 +	75·52	1	56·50	1 +
27·80	1 +	98·68	1 +	76·70	1 +	57·18	2
30·27	2	4801·11	1	79·89	2	59·45	1
32·56	1	06·11	1	5117·33	1	61·68	1
35·33	1	06·37	1	47·73	1	65·20	1
37·42	3	06·68	1	87·61	2	66·20	1
39·30	1	07·85	1 +	91·80	1	82·82	1
39·69	2	08·79	1 +	5205·67	1 +	94·95	1
41·80	1	09·95	1 +	06·23	1 +	95·20	1 +

5596·14	1	5679·25	1 +	5800·03	1	6143·57	1 +
99·30	1	80·50	1 +	38·36	1	6229·2	1 + br
5601·54	1	83·33	1 +	5923·24	1 +	32·70	1 +
10·47	1	83·98	1 +	28·57	1 +	72·30	2
10·73	1 +	86·05	1	41·09	1	99·76	1 +
11·11	1	96·05	1	41·78	1	6321·6	1 + br
13·93	1	97·22	1	59·92	1	44·22	1
23·24	1 +	99·44	1	76·07	2	71·34	1
30·60	1 +	5703·45	1 +	95·55	1 +	93·30	1
37·60	1	11·68	1	6034·45	1 +	6425·55	1
55·37	1	15·47	1	43·66	2	67·12	1
69·14	2	69·15	1	98·57	1	73·9	1 + br
70·19	1	84·3	1 + br	6108·99	1	6513·93	1 +
77·96	1						

XV. Cl. Chlor.

Ältere Messungen: A. de Gramont, Ann. chim. phys., 10 (1896).

J. M. Eder und E. Valenta (Geißlerrohr), Wien. Anz. (1898); Denkschr.

der K. Akad. der Wiss. in Wien, 58 (1899).

Material: Kaliumchlorid auf Gaskohle.

Verunreinigungen: Keine.

Linienzahl: 101.

2928·9	1 + br	3353·55	3 +	3805·6	2 + br	4158·3	1 + br
36·8	1 + br	67·5	1 + br	10·2	2 + br	4254·3	2 + br
60·6	1 + br	77·4	2 + br	18·5	2 + br	77·6	1 + br
3071·4	1 + br	92·95	2 +	20·7	1 + br	91·90	2 +
3123·9	1 + br	93·60	2 +	28·3	2 + br	4304·25	1 +
29·6	1 + br	3404·8	1 + br	34·1	2 + br	07·85	3 +
91·55	3 +	22·5	1 + br	38	1 + br	36·7	2 + br
3221·2	2 + br	33·4	1 + br	44·0	2 + br	43·90	5 +
44·4	1 + br	40·8	1 + br	46·2	2 + br	73·2	2 + br
48·6	1 + br	3530·15	2 +	51·8	3 + br	4423·9	1 + br
59·3	2 + br	60·80	2 +	61·6	5 + br	25·7	1 + br
61·7	1 + br	83·9	1 + br	69·2	1 + br	82·0	1 + br
76·8	1 + br	3602·20	4 +	3914·40	2 +	90·3	1 + br
83·5	1 + br	12·92	3 +	17·2	1 + br	4570·2	1 + br
85·9	1 + br	22·78	1 +	21·95	1 + br	73·1	1 + br
89·85	1 +	50·28	1 +	43·1	1 + br	4667·5	1 + br
91·2	2 + br	57·05	1 +	91·70	2 +	4740·4	1 + br
3315·6	1 + br	58·50	1 +	4018·7	1 + br	68·80	2 +
18·8	1 + br	59·9	1 + br	26	1 + br	71·2	1 + br
20·5	2 + br	70·4	1 + br	39·8	1 + br	80·1	1 + br
33·9	1 + br	74·0	1 + br	59·4	1 + br	81·40	3 +
36·2	1 + br	3720·55	1 +	94·6	1 + br	94·65	30 +
40·50	3 +	99·6	2 + br	4132·73	10 +	4810·10	20 +

4819·52	10 +	5078·25	2 +	5221·5	1 + br	5423·65	2
96·80	2 +	5218·0	1 + br	5392·25	2 +	43·7	1
4904·85	2 +						br

XVI. Co. Cobalt.

Ältere Messungen: Fehlen.

Material: Metall von C. Schuchardt.

Verunreinigungen: C, Ca, Cu, Fe, Mg, Mn, Ni.

Linienzahl: 1360.

2173·44	1	2221·9	1 + Ni?	2256·10	1 +	2285·00	1
74·13	1	22·33	1	56·21	1 + Ni?	85·88	1
75·25	1 Ni?	23·03	2	56·82	3	86·25	6 u
78·7	1 +	24·14	1	57·9	1 + br	87·93	1
80·25	1 +	24·47	1	58·72	1	88·66	1
81·8	1 +	24·93	2	59·21	1	89·18	1
82·09	1	26·40	2	60·10	3	90·42	1
87·13	1	30·58	2 +	61·39	1	90·70	1
89·07	1	32·14	2	61·65	1	91·49	2
90·79	2	32·55	1 +	62·69	1	92·08	3
92·59	2	34·9	1 +	63·61	1 +	92·50	1
93·70	2	35·15	1 +	64·27	1 +	92·80	1
98·38	1	36·88	1	64·96	1	93·50	2
2200·50	1	39·85	1	65·4	1 + Ni?	93·65	2
03·05	2	40·20	1	65·81	1	95·30	1
05·16	1	41·30	1	66·61	2	96·01	2 +
05·61	1	41·71	1	66·88	1	97·21	2 Ni?
05·94	1	43·0	1 +	68·23	1	97·45	1
06·30	2	43·95	1 +	68·81	1	97·57	1 Ni?
07·99	2	44·50	1 +	70·05	1	98·35	2
09·1	1 +	45·20	3	71·28	1 +	98·81	2
09·57	1	46·2	1 + br	72·34	2	99·80	3
11·13	1	48·2	1 + br	72·89	1 +	2300·56	1
11·50	2	48·74	1	73·72	1 +	00·86	2 Ni?
13·26	1	50·05	1 +	74·61	1	01·49	2
13·95	1 +	50·47	1 +	75·51	1	04·11	1
14·87	1	50·65	1 +	76·65	1 +	04·35	1
16·52	2 Ni	51·21	1	77·01	1 +	06·20	1 +
17·35	1 d	51·40	1	78·06	1 +	06·90	1
17·77	1 +	52·1	1 + br	78·57	1	07·12	1
19·14	1	52·45	1 +	79·13	1	07·60	1
19·95	1	52·90	1 +	80·56	2 +	07·97	6 u
20·18	2	53·55	2	81·08	1	09·14	1
20·45	1	53·94	2 Ni?	82·01	2	10·36	1
21·35	1 +	55·06	1	82·46	1	10·96	1
21·6	1 +	55·73	1	83·65	2	11·73	6

2312.64	2	2351.92	2	2395.60	2	2432.62	5
13.68	2	52.29	2	96.06	1	34.82	1
14.14	3	52.97	1	96.34	1	35.20	2 +
14.75	1	53.49	6	96.80	1 +	35.88	1
15.05	3	54.06	1	97.49	10	36.39	2
15.82	1	54.99	1	98.45	4	36.75	2 Ni?
17.13	3	55.58	1	2400.89	1	37.07	3
18.51	3	56.83	1 +	01.20	1	38.46	1 +
19.35	2	58.31	3	01.61	1 d	39.13	2 Ni?
19.91	2	59.68	1 +	02.20	1	40.2	1 +
20.11	1	60.59	3	02.95	1 +	41.15	1 +
21.42	2 +	60.92	2	03.85	2	41.81	2
22.10	2	61.23	2	04.24	3	42.71	5
23.25	1	61.63	3	04.64	3	43.89	4
24.39	5	62.14	1	06.35	1	44.97	1
25.62	1	63.87	10	06.98	1 Ni?	45.65	1
25.85	1	65.17	1	07.46	2 +	46.09	4
26.20	3	67.27	1	07.76	3 +	47.82	10
26.60	3	67.6	1 + br	08.50	3	49.21	3
27.77	3	69.79	1	08.90	3	50.10	6
28.18	1 +	70.84	2	09.56	1 +	52.12	2
29.20	3	71.68	2	11.68	3 r, d	53.3	1 +
30.45	4	71.93	3	12.40	1	53.91	1
34.13	3	72.58	1 +	12.89	1	54.23	2
34.96	1	72.95	1	12.93	1 +	55.56	1
36.08	1 +	73.18	1	13.70	1	56.30	2
36.29	3	74.7	1 +	14.18	4	58.88	1
37.07	2	75.24	3	14.62	2	59.55	3
37.46	1 +	76.98	1 +	15.40	2 Ni?	60.29	1
37.95	3 (Fe)	77.29	1	16.06	3	60.90	1
38.75	2	78.68	10	16.28	3	62.2	1 +
39.10	2	80.59	1	16.99	5	62.77	1
40.36	1 +	81.06	1	17.75	5	63.77	1
41.19	5	81.84	4	18.61	4	63.86	1
42.34	1	82.43	2	19.2	1 +	64.31	8
43.35	1 +	83.55	8	20.82	6	67.15	4
44.34	3	84.20	1	22.15	1	67.77	1
44.70	2	84.97	1 Ni?	22.66	1	69.61	2
45.32	1	86.44	5	23.74	2 Ni?	70.36	2
45.55	2	86.82	3	23.89	2	71.8	1 + br
46.20	1	87.57	1	25.59	4	73.00	1
46.61	3	89.01	10 u	25.67	1	74.01	1
47.14	1	89.63	3	26.20	3	74.85	1
47.42	3	91.47	1	27.08	1	75.48	1 +
47.87	2	91.96	1 +	28.39	3	76.52	1 Pb?
48.49	1 +	92.11	1	28.66	1	76.74	2
49.20	1	92.64	3	29.29	1	77.39	3
50.35	1	94.00	3	30.01	2	77.56	3
51.24	2	94.60	3	30.57	1	78.30	3 d

Funken

Co

2479.13	2	2527.53	1	2574.97	5	2636.12
79.85	1	28.28	2	75.68	2	37.41
82.76	1 Ni?	28.70	5	79.01	1	38.22
83.70	2	29.10	2 Ni?	80.42	20	40.59
84.30	1	30.19	5	80.96	1	43.20
84.46	1	30.60	1	81.33	1	44.54
84.93	1	31.43	1	82.33	15	44.90
85.43	3	32.27	2	83.27	4	46.54
86.52	5	33.90	8	84.07	1 Ni?	48.79
87.21	2	35.42	1	85.26	1	50.07
87.48	2	36.05	3	85.42	1	50.40
88.22	1	36.57	2	86.94	1	52.4
88.55	1	36.88	2	87.32	10	52.91
90.50	3	37.52	2	89.11	2	53.26
91.26	1	38.87	1	90.69	1	53.82
93.67	1	39.54	1	91.75	1	56.02
94.02	1	40.70	6	93.51	1	56.51
94.84	1	42.03	10	94.25	1	60.99
95.66	1	44.31	2	95.39	1	61.17
96.82	1	44.64	2	2601.0	1	61.77
97.59	3	45.15	3	03.35	1	63.65
98.94	5	45.79	1	04.53	3	65.32
2500.71	1	46.26	2	05.81	3 Mn	66.26
02.23	1 +	46.83	5	06.02	2	67.00
04.63	2	48.02	1	10.9	1	70.94
06.58	10	48.42	2	12.75	1	72.2
06.97	1 +	48.82	1	13.60	1	72.68
07.77	1	49.17	1	14.41	6	74.03
08.08	3	49.40	1	15.40	1	76.06
10.17	2	52.49	3	16.32	1	78.14
11.28	4	53.10	2	17.05	1	79.84
12.18	2 C?	53.45	2	17.95	1	80.22
12.50	1	54.1	1	19.00	3	80.53
13.00	1	55.16	2	19.38	1	82.00
13.19	1	56.90	4	19.91	1	82.28
14.45	1	57.47	4 r	21.05	1	84.66
16.22	1	58.70	1 Ni?	22.17	1	85.45
16.6	1 +	59.51	10	22.56	1	86.3
17.50	3	60.18	8 r	22.82	1	87.0
17.90	2	61.4	1	23.58	1	88.32
18.25	1 +	62.24	2	23.88	1	89.90
19.1	1 +	62.65	2 (Fe)	24.48	1	92.07
19.91	10	64.13	15 r	26.99	2	92.35
20.91	1	65.49	3	27.75	2	93.11
21.49	3	67.43	2	28.91	2	93.22
23.03	4	69.82	3	30.10	1	94.79
24.69	2	72.31	1	30.66	1	95.51
25.11	5	73.50	1	32.37	10	95.96
26.15	1	73.60	1	35.01	3	97.14

2697.95	1	2791.17	1	2930.55	2 + br	3089.71	2
98.50	1 +	92.58	1	43.27	2 +	90.40	1
2700.50	1	94.96	2	47.97	1 +	95.86	1
02.2	1 +	95.70	3	54.86	5	96.55	1 +
02.52	2	96.35	1	55.49	1	96.87	1 +
05.84	1	96.95	1	57.84	1	98.33	2
06.84	5 +	97.23	1	67.06	1	3101.70	3 Ni?
07.60	3 +	98.40	2	73.40	1	02.03	2 Ni?
08.10	2	99.10	1	78.15	1 +	02.54	1
08.54	1	2801.22	1	81.85	1 Ni?	03.87	1
08.96	1 +	02.82	2 Mg	83.76	1	07.2	1 +
09.15	1 +	03.90	1	84.34	1 Ni?	07.67	1 +
10.39	1	07.32	2	85.04	1	09.66	1
14.52	5	10.99	3	87.36	3	10.16	1
16.06	2	15.67	1	89.76	3	10.99	1
16.44	1	15.85	1	95.31	1	11.47	1 +
19.11	1	19.02	1	3000.70	1	13.61	2
21.04	2 +	20.15	1	01.10	1	18.39	1
24.08	1 +	25.38	3	05.95	1	21.56	2
28.00	2 +	35.07	2	08.3	1 +	21.70	2
29.27	1 +	37.29	1	09.04	1 +	26.85	1
31.20	2	42.51	1	13.74	2	27.36	1
33.08	1	45.75	1	15.83	1	29.62	1
34.77	2 + br	48.4	1 + br	17.39	1	30.98	1
38.41	1	50.15	1	17.67	3	34.22	3 Ni?
39.05	2	52.25	1	20.76	1	36.85	1
40.55	1	59.76	1 +	21.21	1	37.46	3
41.15	1	62.74	1 +	22.50	1	37.86	1
41.48	1	65.7	1 + br	26.0	1 +	40.09	3
45.15	3	70.2	1 + br, Mn?	26.51	2	40.8	1 +
48.47	1 +	71.35	4	34.56	1	45.15	1
49.96	1	72.60	1 +	34.79	2	47.18	3
52.23	1 +	78.66	1	39.70	1	49.43	2
53.40	1	79.65	1 +	42.62	2	52.82	1
61.50	1	81.74	2 Si?	44.13	4	54.90	4
63.2	1 +	82.37	1	49.01	3	57.2	1 +
64.30	2	83.6	1 + br	55.85	1	58.90	3
64.85	1 +	86.59	2	60.21	1	59.77	1
66.34	2	90.59	3	61.98	4	61.79	1
66.45	1 +	98.0	1 + br	62.35	1	68.17	1 +
66.98	2 +	99.99	1	64.51	1	69.91	1
69.19	2	2903.35	1	72.13	1	74.27	1
75.2	2 + br	07.1	1 +	72.51	3	75.02	1
76.33	3	14.8	1 +	73.70	1	77.40	2
78.95	1	18.7	1 + br	79.54	1	82.28	1
80.0	1 + br	19.70	1	82.75	3	88.48	1
85.57	1 +	27.80	2	86.53	1	89.9	1 +
86.10	1 +	28.95	1 Mg?	86.91	3	92.35	1
89.67	1	29.66	1	87.93	1	93.29	1

3198.75	1	3354.53	4	3431.78	4	3517.65	1
3210.33	1	56.56	1	33.25	6	18.52	8
10.97	1	58.13	1 +	39.05	1	19.97	1
19.28	1	58.75	1	43.09	3	20.25	3
24.79	1	59.24	1 Ni?	43.35	1	21.75	5
33.05	2 Ni?	59.44	1	43.83	6	23.03	1
35.66	1	61.71	2 Ni?	46.23	1	23.62	5
37.15	1	62.95	2 Ni?	46.52	2	23.8	2
43.96	2	63.43	1	48.53	1	27.02	6
47.30	2	63.90	1	49.31	5	29.19	3
50.14	1	64.43	1	49.61	5	29.99	6
54.35	2	67.27	3	52.5	1 +	33.50	4
60.98	2	69.73	2	53.70	10	34.93	1
63.38	1	70.49	1	55.40	3	36.03	1
65.01	1	71.09	2	57.10	1	43.40	2
65.52	1	73.40	1	61.35	2	45.15	1
71.90	1	74.45	1 d?	63.01	5	46.85	1
76.58	1	76.4	1 +	66.00	5	48.37	1
77.43	1	77.20	1 +	69.17	1	48.56	1
77.77	1	78.53	1	71.55	2	50.75	3
78.95	1	78.91	1	74.24	8	52.86	1
79.36	1	81.63	1	74.71	1	53.15	2
83.60	3	85.39	4	76.52	1	56.1	1 +
87.81	1	87.83	3	78.01	1 Ni?	58.94	2
98.84	1	88.32	5	78.71	1	60.47	1
3307.30	2	90.56	1	78.90	1	61.06	4
08.63	1 +	90.93	1	80.20	1	61.3	2 +
08.93	1 +	95.56	5	83.60	3	62.26	1
12.31	1	99.0	1 +	85.53	3	63.07	1
14.21	2	3402.06	1	87.89	1	64.32	1
18.55	1 +	02.18	1	89.61	8	65.11	4
19.30	1 +	05.30	10	90.95	1	67.15	1
19.61	2	09.35	6	91.51	3	68.9	1 +
19.95	1	12.49	4	95.89	5	69.59	10
22.37	3	12.79	3	96.22	1	70.26	1
25.40	2	15.91	3	96.85	2	70.55	1 +
27.13	2	17.30	4	96.95	2 + (Mn)?	72.05	2 Ni?
28.35	1 +	17.81	1	97.47	1 +	75.14	4
33.53	1	17.90	1	3501.90	4	75.54	5
34.30	4	20.66	1	02.46	6	78.16	2
37.29	1	20.96	1	02.79	3	79.05	1
39.91	2	21.80	1	04.90	1	79.14	1
41.46	2	23.0	1 + Ni?	05.27	1	82.03	1
42.10	1 +	23.92	1	06.50	8	84.95	1
42.85	2	24.01	2	07.94	2	85.31	4
47.06	2	24.67	1	10.03	5	87.35	10
48.27	2	26.64	1	10.59	4	91.90	1
51.67	1	28.38	1 +	12.83	6	95.02	4
52.95	2	28.90	1 +	13.65	4	96.66	1

2:23	4	3702:44	6	3833:04	1 Ni?	3924:69	1
4:62	1	04:24	8	35:61	1	25:31	2
5:17	1	07:19	1	35:82	1	29:41	2 +
5:51	3	07:63	3	36:05	1	33:34	1 +
6:15	1 +	08:99	4	41:60	3	34:08	2
9:95	1	11:81	1	42:25	10	34:85	1
1:86	2	12:35	2	43:85	2	35:44	1
5:54	1	14:91	1	45:65	30	36:17	12
0:56	1	26:80	2	49:40	1 +	39:1	1 + br
1:38	4	29:00	2	50:25	1	40:02	1
4:50	1	30:64	5	51:10	2	41:05	4
5:10	1	31:45	1	52:00	2	41:89	4
7:94	4	32:59	8	56:91	2	42:85	1
1:56	3	33:65	6	58:43	3	45:1	1 +
2:99	2	34:30	3	61:35	10	45:50	5
4:85	2	36:08	4	63:75	2	46:80	2
3:85	1	40:35	2	66:96	1	47:30	2
7:45	1 +	45:65	10	69:4	1 +	51:91	1 +
9:57	2	50:10	4	70:70	3	52:47	2
3:90	2	51:74	3	73:30	15	53:12	6
3:31	2	52:91	2	74:14	15	56:44	1
5:31	1	54:48	3	77:01	5	57:80	1
5:54	1 +	54:85	4	78:90	2	58:10	4
2:20	1	55:59	4	82:04	6	58:75	1 +
7:79	2	59:85	2	84:75	3	61:15	3
2:23	1	60:55	2	85:40	2	65:39	1
4:45	2	74:75	3	90:25	1 + br	68:75	1 +
4:40	1	77:27	1	91:82	1	69:30	6
6:69	3	77:70	2	92:27	2	72:72	5 +
6:60	3	78:45	1 +	93:20	2 +	73:32	4
3	1 +	83:9	1 +	93:45	2 +	73:75	2 + Ni?
9	1 +	87:52	1 +	94:26	30	74:91	4
10	2	89:50	1 +	95:12	5	75:50	2
07	1	96:03	1 +	95:3	1 +	77:35	3
83	1	3801:41	2	98:63	2	78:80	3
34	5	05:94	2	3904:20	2 +	79:08	2 +
20	2	08:24	3	04:96	1 +	79:70	4
72	6	11:23	2	05:70	1 +	83:22	2
55	4	12:61	2	06:45	3	85:23	1
24	8	13:45	1	08:55	1 +	85:65	1 +
64	3	14:08	1 +	10:10	4	87:27	3
10	1	14:60	3	15:63	1	89:1	1 + br
64	1	16:43	3	17:26	4	89:85	1 +
90	3	16:56	4	19:78	1 +	90:50	3
30	4	16:63	3	20:30	2	91:82	8 + d
66	4	17:01	2	20:75	1 +	94:70	1
60	1	18:07	2	20:90	2	95:07	2 +
48	1	20:05	2	21:30	1 +	95:53	20
16	1	31:83	1	22:90	3	97:21	1

3998:10	10	4096:70	1 +	4285:94	1	4526:95	1 +
98:69	1	4104:56	1	87:50	1 +	28:1	1 +
99:4	1 + br	04:91	2	92:40	1	31:20	10 r
4002:02	1	06:56	1	98:13	1 +	33:40	2 -
03:75	2	08:55	1 +	4301:1	1 +	34:19	4
07:40	1	09:90	1 +	03:36	1	38:13	1 +
08:05	1 +	10:24	1	07:59	1	40:95	1 -
11:12	1 +	10:70	10	09:57	1 +	44:00	4
12:30	1 +	14:77	1	20:57	1 +	45:41	1 -
14:09	4	14:93	1 +	31:45	2 +	46:14	1 +
15:35	1	17:32	1 +	39:80	3	49:85	5
16:17	1 +	18:44	1	54:1	2 +	53:57	1 +
16:9	2 + br	18:94	20	57:07	1 +	59:49	1 +
18:24	1	21:51	20	59:67	1 +	62:13	1 +
19:43	2	22:43	1	61:05	1 +	64:2	1 +
21:06	5	23:02	1	66:31	2 +	64:4	1 -
23:55	3	23:35	1 +	71:30	2	65:02	1 +
25:60	1 +	25:55	1	73:79	2	65:83	8
27:16	3	39:60	2	75:13	2	66:81	1 +
35:69	3 +	45:31	3	75:72	2	69:48	2
37:36	1 +	50:64	1	79:45	1 +	70:20	2
39:14	1 +	58:60	2	80:25	2 +	74:45	1
40:2	1 +	60:86	8	88:06	1 +	79:53	1
40:97	1 +	62:37	3	91:76	2	80:35	1
44:0	1 +	71:10	1	92:08	2	81:82	10
45:54	5	79:41	2	96:07	2 +	88:90	1 -
48:37	1 +	87:45	2	4402:83	2 +	94:81	3
49:47	1 +	90:01	4 + (O)	05:10	1 +	97:09	3
53:09	3	90:90	3	14:09	4	4616:44	1
54:05	1	4207:75	1	17:57	2 +	23:23	1
57:10	2	08:75	1 +	21:54	2	25:92	2
57:35	2	15:05	1 +	31:77	1	29:54	5
58:35	3	20:50	1 +	45:25	1 +	44:50	1 +
58:76	3	25:32	1 +	45:93	1	57:60	1 +
61:91	1	34:20	1	67:10	3	63:62	5
63:34	1 +	38:20	1 +	69:77	5	82:55	4
66:52	5	42:12	1 +	71:73	2	93:40	3
68:69	5	44:42	2 +	71:98	1	98:57	2
76:74	1	45:72	1 +	78:49	1	4721:64	1 +
77:54	2	48:36	1	82:87	1 +	28:60	1 +
81:62	1 +	52:46	2	83:7	1 +	35:01	1 +
82:75	2	57:8	1 + br	84:11	1	37:92	1 +
84:29	1	63:90	1 +	86:93	1	46:2	1 +
85:77	1	68:63	1	94:91	1	49:90	4
86:49	8	69:59	1	97:56	1 +	54:61	2
88:45	1	72:42	1 +	4500:72	1 +	56:87	1 +
92:58	10	76:21	2 +	14:30	1 +	67:34	1
93:02	1	80:82	1 +	16:80	2 +	68:25	2
96:11	1	83:84	1 +	17:26	3	71:29	3

5:50	3	4840·49	10	5301·23	1 +	5470·70	1
3:40	1	43·70	1 +	31·7	1 + br	83·59	2
9:20	5	68·01	10	42·90	2 +	84·20	1 +
4:64	1	82·87	1	43·60	2 +	89·83	1 +
5:25	1 +	99·68	1	52·30	2	5523·49	1
3:09	8	4928·46	1 +	53·61	2	31·03	1
5:03	1	5146·91	1 +	59·40	1 +	90·95	1
7:99	1 +	5212·86	1 +	62·98	1	5647·45	1
3:70	10	30·35	1 +	69·83	1	6282·88	1
4:20	1 +	35·32	1 +	5444·76	1	6450·50	1
5:10	1 +	66·67	1 +	52·58	1	55·27	1
1:39	1 Ni?	80·80	1 +	54·82	1 +	6563·70	1

XVII. Cp. Cassiopeium.

e Messungen: C. Auer von Welsbach, Sitzber. der Kais. Akad.
er Wiss. in Wien, 116, II b (1907).

erial: Nitrat von C. Auer von Welsbach.

ureinigungen: Ad.

nzahl: 236.

5:64	1	2672·74	1 Ad	2919·48	1 + Ad	3069·80	1 +
5:26	5	84·90	2	51·80	8	70·03	1 +
9:20	1	2701·81	5	53·93	1	70·57	1 +
2:13	2 (Fe)	22·25	1	55·92	3 + r	73·11	1
2:30	3	50·60	2 Ad	63·44	20	77·75	100
9:30	2 +	54·30	10	69·93	10	80·28	1 +
9:36	2 ¹⁾	72·70	50	89·37	2	81·60	3
5:85	3 + ¹⁾	75·50	1	95·99	1	83·42	1
5:93	1	88·38	1 +	3002·74	1 Ad	85·33	1 +
3:61	3	96·73	10	05·89	1 Ad	87·49	1
7:72	1 Ad	2818·89	1 Ad	16·5	2 + br, r	89·21	1 Ad
5:20	4	21·30	2 +	20·69	10	89·90	1 +
3:88	5	27·1	1 + br	27·41	1	90·49	1
2:20	2	34·50	3 + r ¹⁾	40·2	1 + br	91·49	1
4:41	20	47·61	10	55·80	1 +	92·63	1 Ad
3:50	5	58·44	1	56·88	15	94·00	1 + Ad
5:52	20	73·50	1	58·08	30 r	94·74	1
9:36	5	85·25	1 ¹⁾	62·35	1	95·47	1
2:67	1 Ad	91·52	1 Ad	65·14	1 + Ad	96·96	1
3:85	2 Ad	95·00	20	66·42	1 +	98·73	1
7:93	10	2900·48	10	67·85	1 +	99·55	1
5:20	1 Ad	11·59	50	68·06	1	3102·30	1
7:05	1 Ad	12·97	1 +	69·30	1 +	02·47	1

) Gehört nach G. Urbain, C. R., 152 (1911) einem neuen Element Celtium (Ct) an.

3105·2	1 + br, r	3174·63	1 +	3472·62	30	4262·20
05·80	1	83·85	3	79·00	1 Ad	77·67
06·15	1	91·95	15 r	87·2	2 + br	81·17
06·67	1	92·99	2 Ad	92·10	3 + br	96·22
07·95	1 + r, Ad	98·26	10	96·95	1 + r	4342·21
09·45	1	3201·28	1 + Ad	3507·56	20	4451·00
10·35	1	13·49	1	08·59	3	4515·33
12·24	1	17·30	1 + Ad	20·43	1 Ad	18·71
13·48	1	22·75	2 + br	49·98	1 + Cp?	4645·70
14·90	1	43·15	1 + br	54·58	50	48·4
16·81	1	46·15	1 + br	67·99	5	58·20
17·34	1	49·60	2	96·52	1 +	59·20
17·90	1 Ad	54·45	20	3602·07	1 +	74·00
18·53	3 ¹⁾	59·20	1 + Ad?	24·12	10	75·45
19·76	1	61·68	1 Ad	30·90	1	76·35
22·66	1	65·2	2 + br	36·40	3	83·80
24·05	1	79·07	4	42·88	1 +	4726·27
25·05	1	81·84	5	47·93	2	85·62
26·20	1 + Ad	86·17	1 +	53·66	1	4839·65
27·80	1 +	89·51	8 Ad	78·20	3 + br	39·90
28·40	1 +	3305·81	1 + Ad	89·6	1 + br	4905·05
30·44	2 +	12·25	5	94·34	8 Ad	94·32
31·15	1 +	20·46	1	3705·02	2 + br	5001·30
33·34	1 +	32·8	2 + br	3821·00	2	5135·30
34·45	1 +	59·71	5	41·35	2	5402·80
36·89	1 + Ad	75·61	1 Ad	76·81	10	76·89
39·25	1	76·63	5	3937·78	1 +	5736·75
41·01	1 + Ad	80·41	1 +	88·20	3 Ad	5983·91
45·18	1 + Ad	85·65	3	4054·62	2	84·31
47·55	1 +	87·95	1 +	4120·21	2 +	6004·78
51·14	1	91·70	1 + ¹⁾	22·65	1 +	6160·18
53·99	1 Ad	97·18	50	24·88	5	6222·10
67·50	3 + br	3438·91	1 + Ad	54·23	2	35·60
67·95	1 + br	54·20	2 Ad?	71·90	1	42·60
69·75	1	58·41	1 Ad	81·01	1 Ad	6462·86
71·49	3 ¹⁾	64·51	2 Ad?	84·41	20	63·38

Kanten.

4661·95 72·5	K. R. K. R.	4684·40	K. R.	4695·70	K. R.	4708·20
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¹⁾ Gehört nach G. Urbain, C. R., 152 (1911) einem neuen Element Celti

XVIII. Cr. Chrom.

Ältere Messungen: W. E. Adeney, Roy. Dubl. Soc. (1904). F. L.

Cooper, Astroph. Journ., 29 (1909).

Material: Metall von C. Schuchardt.

Verunreinigungen: C, Ca, Cu, Fe, Mg, Mn, Sr.

Linienzahl: 1806.

2132.75	1	2256.15	2	2366.89	2	2465.73	1 +
33.57	1	56.76	1	81.59	2	65.87	1 +
34.65	1	57.55	1	89.86	2	66.33	1 +
35.49	1	57.70	1	94.10	2	66.7	2 + br
41.29	1	57.90	1	97.85	2	69.22	2
44.30	1	58.15	2	98.6	1 +	69.60	1 +
50.82	1	58.25	1	99.75	1	70.95	1 +
70.78	1	58.75	1	2400.32	1 +	72.96	2
71.20	1	61.83	1	04.05	1 + br	75.03	1 +
83.80	1	65.02	1	08.76	1 +	75.78	1
85.10	1	73.50	2	13.73	1 +	77.03	1
90.90	1	75.60	2	16.48	2	77.85	1 +
91.71	1	76.56	2	19.50	1 +	78.70	2 r (C)
98.01	1	77.58	1	19.98	1	79.90	2
98.70	1	84.58	2	20.20	1	83.18	3
2203.32	1	87.30	1	25.30	1 +	83.90	3
08.79	1	89.31	1	25.75	1	85.60	1 +
11.90	1	90.76	2	28.45	1	86.42	2
13.79	1	95.64	2	29.75	1 +	86.76	1
17.59	1	97.27	2	30.20	1 +	87.18	1 +
18.75	1	2300.59	2	33.31	2	89.41	2
19.70	1	06.94	1	35.40	1 +	89.9	1 + d
26.78	2	07.28	2	38.55	2	90.21	1
31.90	1	10.10	1	45.18	1 +	90.9	2 + br
33.87	1	14.73	2	45.65	1 +	92.75	2
35.97	2	14.82	2	46.15	1 +	92.99	2
37.65	2	19.15	2	46.97	1	93.39	2
41.43	1	19.49	2	49.70	2	96.5	1 + br
41.90	1	20.20	2	50.03	2	97.0	1 + br
43.39	1	24.99	4	50.45	1	97.98	1
43.74	1	30.1	1 +	52.80	1	98.94	2
44.21	2	33.56	2	54.14	1	2501.60	1
44.97	1	33.97	1	54.55	2	04.43	1
47.81	1	34.33	1	55.3	1 + br	05.94	1
48.00	1	34.50	1	56.9	1 + br	06.19	1
48.41	1	34.62	1	58.90	1 +	06.49	1
48.69	1	37.82	1	59.05	1 +	10.35	1
49.95	1	40.55	1	60.54	1	11.31	1
50.10	1 +	44.66	1	60.95	1 +	12.10	1
51.62	2	45.41	3	62.44	1	12.52	1 +
52.14	1	65.29	2	65.02	1	13.82	3 +

2515:20	3 +	2567:7	1 + br	2618:85	1 +	2676:68
16:00	1 +	68:70	2 +	19:73	2 +	77:27
16:72	2 +	69:57	1 +	20:63	2 +	78:88
18:41	3 +	70:94	1 +	23:48	2 +	80:01
19:65	1 +	71:89	2	26:15	1	80:40
20:75	2	72:24	1	26:89	2	83:55
22:8	1 +	73:66	2	28:10	2 +	84:22
23:40	4	74:29	1	31:10	3	85:16
23:75	2 +	75:90	1	32:7	1 + br	85:25
27:20	1	77:80	1	33:75	1 + br	86:10
27:52	1	78:40	2	34:45	1 + br	86:49
30:06	4	79:21	1	35:9	1 + br	87:18
30:30	2 +	82:21	1	36:45	1	88:40
31:10	2	82:35	1 +	37:29	1	89:28
31:94	1	83:73	1	37:60	1	89:90
34:42	2	84:20	2	39:25	1 + br	90:5
36:90	1	85:02	1 +	40:1	1 + br	91:15
37:81	1	85:71	1 +	40:83	1	92:22
38:42	5 +	87:50	2	41:52	1	93:62
39:05	1	88:1	1 +	41:95	1	94:8
42:88	1 +	88:3	1 +	43:67	1	96:86
43:23	2	89:15	1	47:6	1 +	97:60
44:41	1	89:80	2	48:24	1 +	98:01
45:29	1	90:55	1 +	50:95	1 +	98:52
46:07	1 +	90:87	3	52:2	2 + br	98:76
46:55	1	91:95	1	53:69	5	98:94
47:65	1 + br	95:67	2	55:90	1 +	99:50
48:15	2	96:20	2 +	57:7	1 + br	2700:72
48:67	3	2601:98	1	58:70	4	01:21
50:14	1 +	03:05	1 + br	59:05	2	01:30
50:42	1 +	03:82	1	59:59	1	01:78
51:70	3	04:25	1	59:89	1 +	02:11
52:00	1	05:73	1	60:9	1 +	02:66
55:65	2 +	06:17	1	61:49	3 +	03:08
57:15	1 +	06:64	2	61:85	3 d?	03:64
57:57	1	07:73	1	63:15	1 +	03:95
58:5	1 +	08:00	2	63:59	5	04:88
59:92	2 +	08:25	1 +	63:8	3 +	05:54
60:81	1	08:91	1	65:8	2 + br	06:22
61:13	1	10:2	1 +	66:19	8	06:65
61:95	1 +	10:93	2 + br	68:07	2 +	08:90
62:6	2 +	11:1	1 + br	68:83	6	09:41
63:45	2	11:70	1	70:21	3	11:01
63:70	3	12:65	1 +	70:40	2	11:3
64:87	1	13:31	1 +	71:95	8	12:41
66:45	1 +	13:62	1	72:50	2	15:75
66:6	1 +	14:72	2 +	72:94	6	17:10
66:99	1	16:30	2 +	75:40	1 +	17:59
67:47	1 +	16:55	1 +	75:79	3	18:2

2718.48	8	2760.4	2 +	2803.45	1	2853.35	3
19.15	1	60.49	2	04.15	1 +	53.95	1
20.17	3	60.61	2	08.14	2	54.28	1
20.37	2	60.96	1	09.4	1 + br	54.72	1
20.79	1	61.85	1 +	09.72	1	55.15	2
22.83	5	62.70	10	10.25	2 + br	55.75	10
23.69	5 d	62.85	2 +	11.0	1 +	56.42	1
24.12	4	63.70	2	11.18	2	56.86	3
26.33	1	64.10	1	11.57	1	57.50	3
26.59	1 +	64.40	2	12.12	10	58.07	2
27.32	5	65.15	1 +	13.64	1	58.75	2
28.25	1	65.59	2	14.35	1	59.02	4
29.83	1	65.70	1	16.92	3	61.05	5
31.99	1	66.00	2	17.67	1	62.69	10
33.69	1	66.62	15	18.07	1	65.22	4
34.66	1	67.35	1	18.48	8	65.46	2
35.83	1	67.69	1 d	22.18	5	65.81	1
37.14	1 +	68.25	1	22.53	10	66.03	2
39.5	2 +	68.68	4	24.69	1	66.85	5
39.84	1	69.45	1 +	25.65	2	67.24	2
40.17	3	69.98	1 +	26.2	1 +	67.75	5
41.16	2	71.40	1	26.29	2	68.75	1 +
42.12	8 r	72.03	2 +	26.55	1	70.54	5
43.70	8	72.47	1 +	28.07	1	71.56	1
44.66	2	73.42	3	28.90	1	71.74	1
45.04	3	74.56	4	30.63	20	73.60	3
45.48	1	76.75	2	32.59	4	73.96	2
46.26	4	78.17	5	33.53	1	74.63	1
47.95	1 +	79.05	1	34.40	5	75.14	2
49.02	8	80.42	5	35.71	30	76.06	5
49.88	2	81.02	2	36.59	2	76.39	3
50.81	10	81.20	2	38.00	2	76.76	1 +
51.96	10	82.48	3	38.90	5	78.06	3
52.49	1	82.70	2	39.34	1	78.54	2
52.90	1 +	83.96	1	40.14	8	79.31	1
53.28	1	84.45	1 +	40.57	1	80.99	4
53.75	2	85.25	1	42.52	1	82.01	4
54.00	2	85.82	8	42.90	1	85.42	1
54.39	3	86.58	3	43.35	15 u	86.53	1
55.11	1	87.71	4	46.50	3	87.11	1
55.35	2	88.00	1	46.80	2	87.88	2
56.39	3	89.19	1	48.51	2	88.85	3
57.04	2	89.51	4	49.46	1	89.30	3
57.81	8	92.26	10	49.94	10	89.62	3
58.73	1	93.77	1	50.45	1 +	89.96	2
59.08	4	95.65	2	50.74	1	91.24	4 d
59.50	4	98.81	3 d	51.49	8	91.53	1
59.83	3	2800.30	2	52.39	1	91.99	2
60.15	2	00.89	10	52.80	1	92.89	1

2893.08	2	2939.57	2	2996.74	2	3057.98	1
93.37	1	40.36	2	98.94	1	58.47	1
93.63	1	41.09	1	99.45	1	59.61	2
94.38	2	42.09	3	3000.10	1	61.73	1
94.95	1	45.85	1	01.04	1	63.42	1 +
95.14	1	46.92	3	04.04	2	63.95	1
95.79	1	47.59	1	05.19	2	65.19	1
96.52.	5 d	49.55	2	10.76	1	67.28	2
96.88	2	49.91	1	11.55	1 +	71.70	1
97.36	1	50.22	1	13.15	1	72.57	1
97.81	3	50.80	1 +	13.84	2	73.37	1
98.65	5	51.53	1	14.90	1 +	73.80	1
99.26	2	52.08	1	15.08	1	77.34	2
99.59	3	52.56	1	15.33	1	77.90	2
2901.15	1	53.47	3	15.62	3	79.45	1
02.77	1	53.81	4	17.71	2 +	83.75	1
03.01	1	54.77	1	18.64	1	84.56	1
03.72	1	55.25	1	18.95	1	85.49	1
04.09	2	56.73	1	20.81	1	88.00	2
04.84	1	57.7	1 +	21.73	2	93.61	3
05.61	1	59.70	1	24.52	2	94.11	1
06.28	1	60.07	1	26.81	8	95.07	1
08.42	1	61.85	4	28.23	3	95.63	1
09.17	1	63.60	1	29.27	1	96.25	3
10.78	2	66.17	3	30.36	2	98.27	1
11.01	1	67.04	1	31.47	1	3103.60	2
11.28	1	67.76	1	33.05	2	07.70	3
11.82	3	68.83	1	34.3	1 +	08.79	2
13.66	1	69.79	1	34.64	1	09.48	1
13.84	1	71.25	1	35.1	1 +	11.0	1 +
15.35	2	72.02	10	37.16	1	12.07	1
16.19	1	75.61	1	38.15	1 +	13.76	1
21.35	3	76.83	2	39.85	1 +	15.40	2
21.94	3	79.88	10	40.30	1 +	15.76	2
22.61	1 +	80.95	1	41.03	10	16.85	2
23.60	2	84.86	1	41.86	5	17.39	1
23.85	3	85.48	10	42.90	1	18.24	1
26.28	2	86.1	2 + br, d	44.01	1	18.80	10
27.20	5	86.61	2	44.34	1	20.50	15
28.27	3	87.05	1	47.74	1 +	21.17	1 +
28.45	3	88.19	2	47.86	1 +	21.33	1 +
29.55	2	88.80	1	50.27	10	21.96	1 +
30.96	2	89.33	10	50.85	1 +	22.72	3
32.82	2	92.06	1	51.7	1 +	25.11	20
33.74	1	92.60	2	52.35	1 +	25.67	1 +
34.07	2	92.7	1 +	53.85	1 +	28.79	5
34.4	2 + br	94.23	1	54.02	2	30.66	1
35.25	4	94.89	2	55.55	1	32.20	20
37.05	2	95.26	1	56.8	1 + br	34.45	3

3135·46	3	3208·13	1	3291·90	3	3358·63	10
35·82	3	08·73	2	95·1	1 +	60·50	20 +
36·79	5	09·31	10	95·61	5	61·96	4
37·23	1 +	11·48	1	98·47	1	63·87	2
37·60	1 +	11·62	1	98·89	1	64·85	1 +
38·3	1 +	12·65	1	3301·37	1	67·59	2
40·02	1 +	13·05	1	03·06	1	68·19	20
40·31	3	16·70	3	04·93	1	68·89	1
42·84	1	17·60	8	07·21	8	69·20	2
43·0	1 +	19·29	2	07·95	1 Cu?	71·60	1 +
45·20	2	19·80	1	08·34	1	72·27	2
45·86	2	19·95	1	10·02	1	75·11	1
47·30	5	25·55	1	10·86	4	76·43	1 +
48·55	1	29·37	1	12·10	3	76·85	1 +
49·93	2	29·50	1	12·37	3	77·50	1 +
50·22	2	30·04	1	13·26	2	78·51	5
52·31	3	31·80	1	14·23	2	79·54	3
54·20	1 +	34·20	6	14·77	3	80·02	5 r
55·25	1	37·89	1	15·45	1	82·82	10
58·15	2	38·24	1	16·65	1	85·49	1
59·05	1 +	38·92	6	22·86	1	86·66	1
59·23	1 +	45·70	1	23·70	1	87·85	1
60·0	1 +	49·70	1 +	24·22	3	88·13	1
60·25	1 +	50·8	1 +	24·47	4	88·90	1
62·59	1	50·98	1	26·75	1	90·95	1
63·93	1	51·76	1	28·50	3	91·61	5
64·05	1 +	52·04	1	29·16	1	93·20	5
69·35	2	52·65	1	29·60	1	94·02	4
72·21	3	55·54	1	33·05	1 +	94·51	4
73·70	1	57·95	1	35·51	8 d?	95·77	3
78·94	1 +	58·90	2	36·49	5	99·69	2
79·53	2 + br	60·10	1	37·11	1	3402·60	4
80·88	10	64·42	3	39·1	1 + br	03·49	15 +
81·60	2	66·43	1	40·00	10	05·4	1 + br
83·48	4	68·65	1	40·88	1	08·90	20 +
84·50	1	69·30	2	42·16	1	10·71	1
86·88	1	69·95	2	42·78	10	11·16	1 +
88·15	1 +	70·35	3	43·46	1	12·35	1 +
90·00	1	71·25	1	44·65	1	15·60	1 +
94·1	1 + br	73·05	1 +	46·15	1	17·93	1 + (Fe)
94·77	1	74·13	1	46·86	1	19·44	1 +
97·21	15	76·06	1	47·99	6	21·33	10
98·15	1 +	78·92	1	49·2	1 +	21·77	1 +
3200·01	1	79·67	1	49·50	2	22·89	20 +
00·57	1 +	83·19	2	51·77	1	24·78	1
01·40	2	86·06	2	52·12	1	26·26	1
02·65	1	86·45	1	53·27	3	27·24	1
03·66	1	88·15	1	55·3	1 +	27·75	1
05·24	2	91·40	1	57·54	4	28·05	1

Funken

Cr

3430.02	1	3471.66	1	3564.45	1	3651.84
30.57	1	72.23	3	64.88	1	54.10
31.42	1	72.96	1	66.25	2 + br	56.43
31.80	1 +	73.05	1	69.30	1 +	58.34
32.15	1	73.77	1	72.90	1	63.03
32.48	1	74.54	1	73.80	1	63.42
33.45	5	75.28	3	74.21	1	65.10
33.73	2	77.33	1 +	74.96	3 +	66.15
34.23	2	78.30	1	78.81	20 u ¹⁾	66.83
35.82	1	78.90	1	82.79	1	68.20
35.93	1	80.45	1 +	84.5	2 + br	76.49
36.31	2	81.45	2	85.44	4	77.86
36.88	1	81.70	2	85.64	3 +	78.04
38.57	1	82.75	2	93.63	20 u ¹⁾	79.21
40.73	1 (Fe)	83.65	1	94.50	1	80.03
41.24	1	84.29	3	99.54	1	81.86
41.57	2	86.64	1	3601.81	3	84.41
43.94	1	88.58	1	02.74	1	85.74
44.50	1	94.68	1	03.92	10	86.88
45.74	2	95.11	1	05.48	20	87.65
47.15	1	95.53	3	08.55	1	88.60
47.57	2	95.68	2 +	09.65	1	89.48
47.90	1	3502.45	1	10.22	1	89.76
49.4	1 +	03.51	1	12.79	1	93.26
51.00	1	08.24	1 +	13.37	3	95.2
53.47	2	10.69	1	13.84	1	96.05
53.88	1	12.00	4	15.80	1	96.96
55.11	3	13.20	1	17.45	1 +	98.16
55.4	1 +	18.80	1	19.61	1	3711.44
55.74	2	22.30	1	21.65	1	13.12
57.78	4	23.1	1 +	26.45	1 +	15.33
58.25	1	27.24	1 +	31.76	10 d?	15.58
59.43	3	31.57	1 +	33.00	2	16.66
60.58	1	33.02	1	34.15	1	23.54
61.45	1 +	36.65	1 + br	35.16	1	27.49
62.88	1	39.12	1 +	36.75	3	30.95
63.73	1 +	47.22	1 +	39.98	5	32.19
64.16	1	48.9	1 + br	41.64	1	37.70
64.97	1	50.78	2	42.01	3	38.53
65.37	1	52.8	2 + br	43.35	1	43.14
65.70	1	54.11	1	44.84	1	43.71
66.4	1 +	56.25	1	46.30	1	44.06
67.15	1	58.8	2 + br	47.52	1	44.64
67.85	1	59.94	1	48.68	1	47.44
68.90	1	62.46	1	49.19	3	48.80
69.75	1	62.6	1 +	49.98	1 +	49.16
70.6	1 +	64.09	1	50.54	3	50.71

¹⁾ Rote Komponente stärker.

3754.75	2	3849.64	2	3928.80	3	4026.31	2
57.34	1	50.20	2 r	36.27	1 +	27.25	2
57.83	2	52.37	1	37.75	1 +	30.86	2
58.20	1	52.74	1	38.5	1 + br	31.32	1 +
61.85	1 +	53.36	1	41.33	1	33.46	1
62.0	1 +	54.40	2	41.66	3	37.45	1
65.75	1	55.0	1 + br	43.78	1 +	38.19	2 +
67.58	1	55.45	1	45.25	1 +	39.25	3
68.40	2	55.75	1	45.65	1	43.87	1 +
68.86	1	56.47	1	46.13	1	48.93	2
78.86	1 +	57.80	2	49.00	1	49.3	1 + br
83.95	1 + br	62.72	1 +	49.8	1 +	49.93	1
89.03	1	65.80	1	51.25	1 +	51.52	1
89.90	1 +	66.71	1	51.95	1 +	52.15	1 +
90.39	1	68.44	1	52.53	1	54.27	1 +
90.64	1	70.4	1 + br	53.30	1	56.23	1 +
91.55	2	71.6	1 + br	58.22	1	56.96	1 +
92.31	2	72.70	1 (Fe)?	60.91	1	58.96	3
93.46	2	74.73	1 +	63.88	8	60.82	1 +
94.05	2	75.4	1 + br	69.21	2	64.76	1 +
94.79	1	79.41	1	69.92	8	65.88	2
95.20	1 (Fe)	81.45	1 +	71.42	1 (Fe)	67.10	2
97.32	1	82.05	1	72.87	1	68.01	1
97.90	2	83.48	3	76.83	8	71.11	2 +
3801.4	1 + br	83.85	1	78.82	1	75.05	1
05.00	3	85.39	3	79.66	2	76.12	4 +
07.01	1	86.97	3	79.94	1 +	77.25	1
08.10	1	91.01	1 +	81.40	1	80.45	1 +
09.68	1	92.12	1 +	83.42	1 +	81.95	1 +
12.45	1	94.21	3	84.09	5	82.53	1 +
14.17	1 +	97.82	1 +	84.51	2	86.34	1 +
14.79	1	3902.25	1 +	90.15	3	90.55	1 + br
15.60	2	03.09	3	91.30	4	92.40	1
16.35	2	03.33	1	91.84	2	93.30	1 + br
18.00	1	05.81	2	93.02	3	98.63	1
18.64	1	07.50	1 +	94.14	1	99.20	1
19.75	2	07.93	1	99.03	1	99.62	1
21.07	1 +	08.91	3	99.85	1	4100.01	1
21.75	1 +	11.53	1	4001.61	2	01.34	1
23.67	1	14.52	1	02.68	1 +	05.05	2
25.56	1	15.72	1	03.48	2 +	08.57	1
26.56	2	16.04	1	04.07	1 +	09.75	1
30.19	2 +	16.41	2	12.67	3	11.19	2
31.20	1	17.18	1 +	14.83	1	13.44	1 +
34.91	1 +	17.78	1	16.99	1 +	20.79	1
36.24	1	19.36	5	18.37	1 +	21.45	1
41.46	3	20.3	1 +	22.43	2	22.01	1
49.15	2	21.20	3	23.88	1	22.36	1
49.52	2	26.83	1	25.17	1	23.65	2

5255·20	2	5313·07	1	5391·53	1	5649·58
61·90	1 +	13 80	1	5400·80	2 (Fe)	64·26
64·32	3	18·95	1	05·21	1	81·4
65·30	1	28 52	10 +	07·80	1 +	82·6
65·90	2	29·30	1 +	10·04	8	83·7
72·20	1 +	30·0	1 + br	21·15	1	94·95
75·3	2 + br	35·09	1	42·62	1	98·56
75·7	1 + br	38·00	1	64·15	1	5702·55
76·1	1 + br	40·66	1	78·58	1	13·00
96·86	3	45·00	1	80·81	1	83·38
97·50	2 +	46·00	5	5502·30	1	84·15
98·2	1 + br	48·50	3	03·40	1	85·23
98·43	4	68·71	1	08·83	1	86·04
5300·90	2	70 51	1	10·93	1	88·20
04·33	1	73·88	1	5620·9	1 + br	91·26
06·03	1	87·16	1	28·88	2	6330·30
08·60	1	87·77	1	42·60	1 +	63·0
10·92	1 +	90·60	1			

XIX. Cs. Caesium.

Ältere Messungen: Fehlen.

Material: Caesiumchlorid von E. Merck, auf Gaskohle.

Verunreinigungen: Ba, Ca, Sr.

Linienzahl: 66.

2267·70	2 +	2525·84	1	9149·52	1 +	4265·7
73·91	1 +	44·05	4 +	52·58	1 +	77·28
85·49	1 +	73·21	1	3268·45	2 +	4364·5
86·24	1 +	97·02	2 +	3315·7	1 + br	73·20
2315·8	1 + br	2600·45	1 +	49·61	1 +	4406·5
17·03	1	09·57	1 + br	3559·9	1 +	4501·80
32·54	3 +	10·24	1 + br	97·60	2 +	26·90
40·65	1 +	30·67	3	3608·41	1 +	40·2
75·9	1 + br	2700·7	1 + br	61·52	1 +	55·49
79·3	1 + br	01·31	1	3806·0	1 + br	93·40
93·00	3	2811·00	1 +	61·6	2 + br	4603·99
2425·28	2 +	17·05	1 +	98·0	1 + br	5831·7
26·5	1 + br	46·1	1 + br	3925·85	1 +	5926·2
27·83	1 +	59·50	2	59·77	1 +	6010·5
55·97	1	2931·15	1 + br	4006·7	1 + br	6213·5
77·71	1	77·02	1 +	41·0	5 + br	6723·5
85·59	1	3066·8	1 +			

XX. Cu. Kupfer.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 63 (1896); Sitzber. der K. Akad. der Wiss. in Wien, 118, IIa (1909) (Rot).

Material: Elektrolytisch gereinigtes Metall von Dr. E. Murmann, Wien.

Verunreinigungen: Ag, Ca, Zn.

Linienzahl: 328.

2104·89	1 +	2264·00	3 +	2458·73	1 +	2641·65	1 +
12·19	2 +	65·55	2 +	59·45	1 +	44·00	1
17·46	2 +	76·36	4	66·00	1 +	66·52	3 +
23·08	2 +	86·80	2	68·67	2 +	89·56	8
25·28	1 +	91·20	2	73·55	4 +	2701·21	8
26·12	2 +	92·79	1	82·43	2	03·42	5
34·49	2 +	94·45	4	85·99	5 +	13·76	8
36·08	3 u	2309·71	1 +	86·60	1 +	19·02	6
47·10	1 +	23·20	1 +	89·70	5	21·93	2 + (Ag?)
49·08	2 +	36·30	2	92·24	2	37·6	1 +
51·99	1 +	46·22	1	96·20	1 +	40·0	1 +
61·49	2 +	48·86	2	97·70	1	45·52	2 +
65·14	1 +	55·19	2	2506·51	10 r	66·53	2
75·13	2 +	56·67	3	08·7	1 +	69·95	10
79·49	3 +	61·67	1 +	11·50	1 +	2813·10	1
82·88	1 +	63·3	1 +	16·5	1 + br	24·49	4
89·69	3 +	64·3	1 +	17·05	1 + br	37·68	3 +
92·35	3 +	67·55	1 +	18·55	1 + br	58·0	1 + br
95·87	2 +	68·20	1	19·0	1 + br	58·4	1 + br
99·71	1 + u	69·94	10	21·15	1 + br	77·97	3 +
2201·65	1 +	70·93	1 +	22·45	1	83·05	2
09·94	1 +	72·34	1 +	23·25	1 + br	84·48	2 +
10·35	3 +	76·43	2 +	25·1	1 + br	2961·30	4
12·95	1 +	85·10	1 +	26·79	4	78·41	1 + br
15·28	2 +	91·81	1	29·50	8	79·50	1 +
18·19	3 +	92·72	1 +	32·2	1 + br	97·50	3
18·7	1 + br	2400·18	6	32·95	1 + br	3010·95	3
24·95	2 +	03·51	6 +	35·4	1 + Ag?	21·70	1 +
25·80	1 +	05·54	1	38·8	1 +	22·71	1 +
26·95	2 +	12·18	1	45·02	20	36·20	2
27·89	1 + u	12·39	1	53·33	1 +	63·55	3
28·94	3 +	24·62	2 +	66·50	1 +	73·95	2
30·19	2 + u	29·10	1 +	71·99	1 +	88·20	1 +
31·10	1 +	30·5	1 +	73·50	1 +	94·11	2
31·74	1 +	35·95	1 +	90·75	3 +	3100·04	5 +
42·69	6 +	41·70	2	99·03	3 +	08·75	6 +
47·06	8 u	43·47	1 +	2600·49	5 +	16·45	2 +
49·12	2 +	44·50	2	09·39	2	26·22	3 +
55·13	2 +	46·9	1 +	18·50	3 r	28·80	2 +
63·40	2 +	53·13	1 +	20·87	1 +	40·50	2 +

3142.56	2 +	3450.50	8 +	3777.2	1 +	4932.6
46.95	2 +	54.89	5 +	91.2	2 +	54.9
56.77	1	57.99	2	3800.60	1	74.7
69.77	2 +	65.6	1 + br	09.30	1 +	86.5
70.7	2 + br	72.25	1	09.75	1 +	5013.5
94.22	3	76.13	3	60.65	1 +	16.8
3208.32	2	83.90	5	4003.20	1 +	34.5
23.50	2 +	87.70	1 +	22.85	20 r	52.9
24.75	2 +	88.98	1 +	43.62	4	67.0
26.71	1 +	3512.25	5 +	62.87	10 +	76.4
31.25	3 +	17.1	1 +	80.7	1 +	89.5
35.80	3 +	20.13	2	4123.50	2 +	5105.7
43.27	5 + br	24.39	3	78.0	2 +	12.1
47.66	30 +	27.60	1 +	4228.10	2	24.7
52.40	1	30.53	3	49.15	5 r	44.4
66.15	2	33.88	2 +	59.65	2 +	53.4
68.40	2	45.0	1 +	75.30	20 r	5201.2
74.08	30 +	99.27	3 +	4378.34	20 +	18.3
77.42	1	3602.17	3 +	4415.7	2 +	20.2
79.92	3	13.90	2 +	80.61	2	50.8
82.80	8 +	14.30	1	4506.16	2	92.7
90.67	8 +	20.60	1 +	09.53	3 r	5352.9
93.05	2	21.3	2 +	31.02	2	55.3
3308.07	10 +	24.4	1 +	39.9	5 +	60.3
17.30	3 +	27.4	2 +	87.2	20 +	91.8
19.78	2 +	36.05	2 +	4651.38	10 + r	5408.3
29.73	2 + br	41.82	1 +	67.4	1 +	32.4
35.36	2 + br	45.3	1 +	75.00	3 +	63.4
37.97	3	48.50	1 +	97.75	1 + br	78.3
49.40	3 +	56.00	1	4704.79	2	5535.5
54.63	1 +	59.5	1 +	58.60	2	40.7
65.51	3 +	65.89	1	67.5	1 + br	43.7
75.81	1 +	72.10	1 +	97.30	1 +	55.7
81.3	1 + br	77.0	1 +	4814.0	1 + br	74.7
81.54	1	84.8	1 +	32.42	1	5609.3
95.59	1 +	86.69	3	42.5	1 + br	35.7
96.47	1 +	3700.65	1 +	52.0	1 + br	52.7
3402.4	2 + br	34.28	1	56.5	1 + br	5700.7
04.8	2 +	41.40	1	66.8	1 + br	10.7
15.9	3 +	52.5	1 +	71.5	1 +	22.7
20.30	1 +	59.6	1 +	4910.5	2 + br	32.7
22.2	1 + br	72.02	1 +	19.3	1 + br	82.7

XXI. Dy. Dysprosium.

Ältere Messungen: Fehlen.

Material: Dysprosiumnitrat von C. Auer von Welsbach.

Verunreinigungen: Nh?

Linienzahl: 1464.

80	1 +	2986:04	1	3081:01	1	3139:60	1
16	2	90:63	1	81:70	1 +	40:73	2
71	1 +	91:48	1	82:63	1	41:21	2
95	1 +	91:73	1 +	84:76	1 +	42:39	1
50	1 +	3002:55	1 +	85:30	1 +	43:30	1
11	1	02:80	1 +	87:50	1 +	43:93	1
68	1 +	03:85	1	89:88	1 +	45:30	1
89	1	04:30	1 +	93:20	1	46:25	1
62	1	05:02	1	93:95	1	47:00	1 +
44	1 +	15:19	1	94:70	1 +	47:61	1
63	1 +	15:79	1	95:17	1 +	50:00	1
50	1 +	17:05	1	95:46	1 +	50:25	1
52	1 +	26:26	1	95:84	1 +	52:00	1
49	2	27:68	1 +	96:96	1	52:39	1 + br
68	1 +	29:95	1	98:67	1	53:40	1
24	2	30:50	1	3101:01	1	54:3	1 + br
07	1 +	31:28	1 +	02:02	2	54:7	1 + br
33	1 +	33:30	1	02:30	1 + d	56:60	3
80	1 +	36:83	1	03:36	1	57:30	1 +
00	1 +	38:40	2	03:95	1	57:64	1 +
83	1 +	43:27	2	05:13	1	60:61	1
82	1	43:56	1	05:79	1	61:12	1
16	1 +	44:69	1	06:15	1	62:94	3
40	1	49:23	1	07:13	1	64:16	1
90	1 +	51:56	1 +	09:44	1	67:56	1
60	1	52:44	1	09:89	2	67:93	1 +
12	1 +	57:05	1	10:40	1 +	68:20	1 +
86	1	59:56	1	10:88	1 +	68:70	1 +
10	1	60:12	1	12:23	1 +	69:67	1 +
11	1	60:75	2	13:22	1 +	70:10	2
50	1	61:50	2 +	13:51	1	70:85	1
06	1	62:29	1	14:90	1	71:60	1
76	1	62:70	2	17:00	1	75:01	1
06	1	63:85	1	17:63	1	77:66	1
95	1 +	65:25	1 +	18:05	1 +	78:01	2
49	1 +	67:09	1	20:30	2	78:50	1
65	1	69:03	1	22:15	1 +	80:80	1
30	1 +	69:80	1	22:63	1 +	82:05	1 +
17	1	70:55	1	23:10	1 +	83:30	1
55	1 +	72:00	1	24:99	1	84:35	1
25	1 +	72:50	1 +	26:26	1 +	84:90	1
40	1	73:02	1 +	26:86	1	86:50	2
19	1	73:65	2	27:53	1 +	87:80	2
83	1	75:25	1 + d	28:48	2	88:80	1
49	1	75:58	1	30:30	1 +	89:18	1
86	1	75:95	1 +	32:21	1	89:90	1
75	1 +	78:44	1	32:70	1 +	90:27	1 +
49	1 +	79:45	1	33:13	1	93:10	1
77	1	80:37	1 +	35:49	3	93:41	1

3193:99	1 +	3257:47	1 +	3311:09	2	3353:7
96:55	1	60:13	1	12:45	1	55:1
97:71	1	60:80	1	12:82	2	55:7
99:33	1	61:35	1	13:46	2 +	56:3
3201:44	1 +	62:12	1 +	15:08	1	57:3
01:75	1 +	64:85	1 +	16:40	2	57:4
02:72	1 +	65:30	1 +	17:22	2	57:7
02:95	1 +	65:70	1 +	18:25	1	58:0
04:49	1	66:12	2	18:56	1	58:4
05:60	1	66:35	2	18:86	1	58:7
06:51	1	69:25	1	19:99	3	59:1
06:80	1 +	69:70	1	22:00	1	59:6
07:24	1	72:20	1	23:10	1	60:7
08:47	1 +	72:81	2	24:36	1	61:3
08:96	1	75:11	1	26:31	2	62:3
12:20	1	76:05	1	26:60	2	63:5
12:57	1	76:90	1	27:20	1 +	64:5
12:81	1	78:50	1	27:46	1 +	65:2
14:78	1	79:60	1	30:41	1	65:9
15:32	2	79:85	1	30:73	1	66:3
16:76	3	80:22	2	31:36	1	67:3
17:50	1	81:80	1 +	33:22	1	67:7
20:60	1	82:91	3	33:70	1	68:2
21:63	2	84:49	1	34:30	1	68:7
23:42	2	85:10	1	34:60	1	69:4
25:25	1	88:10	2	34:98	1	69:7
26:10	2 d	88:80	1	35:60	1 + br, d	70:2
26:50	1	89:50	2 +	36:00	1 +	70:6
27:85	1 +	91:20	2	36:99	1	71:0
29:10	1	94:00	1	37:30	1	71:8
29:50	1	94:79	1	37:47	1 +	73:8
30:09	1	95:10	1	38:40	1 +	74:4
32:26	1 +	95:35	1 +	39:61	2	75:8
32:76	1	96:08	1	41:10	2	76:1
34:65	1	96:48	2	41:58	1 +	76:4
36:00	3	97:78	2	42:77	1	76:8
36:75	2	99:30	1 +	44:60	1	77:2
40:97	2 +	3301:05	1	45:46	1	78:3
42:10	1	02:25	1	45:89	1	78:5
43:88	1 +	02:65	1	46:80	1	79:0
45:24	2	03:30	1 +	47:92	4 d	80:3
48:50	1	04:20	1	48:13	1	81:7
49:53	1 +	04:47	1	49:05	1 +	82:1
51:42	3	04:89	1	49:53	1	84:3
52:00	1	05:60	3	50:79	1	85:1
52:32	1	06:40	2	51:10	1	86:7
54:02	1	06:96	1	52:33	1 +	87:0
54:60	1	08:95	5	52:80	2	87:4
56:37	2	10:00	1 +	53:35	1	88:2

3528.20	1 d	3567.03	1 +	3605.00	1	3630
28.66	1	68.20	1	05.30	1	3
29.12	4	68.55	1	06.27	3	3
30.70	2	69.82	1	07.05	1	3
31.88	20	71.13	1	07.40	1 +	4
32.69	1	71.82	1	07.85	1	4
33.91	1	72.81	1 +	08.25	1	4
34.60	2	73.22	1	09.42	1	4
35.13	3	73.99	4	10.98	1	4
36.21	5	74.30	4	11.34	1	4
37.81	2	74.75	1	12.09	1	4
38.70	4	76.31	3	12.90	3	4
39.50	2 +	77.02	3	13.26	2 +	4
39.80	2	78.09	3	14.23	3	4
40.85	1	78.74	1 +	14.85	1	4
42.00	1	79.02	1	15.11	1	4
42.48	3	79.30	1	15.35	1 +	5
42.98	1	79.60	1	16.24	1	5
43.84	1 +	80.20	3	16.55	1	5
44.35	3 +	82.18	2	17.38	1	5
44.47	2	84.59	2	17.85	2 +	5
45.10	1	85.20	3	18.29	2	5
45.50	1	85.89	3	18.66	1	5
45.90	1 +	86.30	2 +	19.63	1	5
46.99	4	87.51	1	20.09	1	5
47.69	1	90.22	2	20.32	2	5
48.32	2	90.82	2	20.75	1	5
48.86	2	91.55	3	21.30	1 +	5
49.37	2	91.98	2	21.70	1 +	5
50.35	10	92.30	3	22.77	1	5
51.29	1	93.30	2	22.91	1	5
51.74	3	93.85	1	24.40	4 +	5
52.15	1 +	94.35	1 + d	25.14	1	5
53.34	2	94.77	1	25.87	1	5
54.99	2	95.21	3	26.50	1 +	5
56.11	2	95.45	2 +	26.94	1	5
57.77	2	96.21	2	27.30	1	5
58.34	2	96.64	1	27.61	1 +	5
59.42	2 +	97.45	1	28.17	1	5
60.30	2	98.09	2	28.87	1	5
60.55	2 +	98.45	2 +	29.59	5	5
61.37	1	99.19	2	30.39	5	5
62.86	1	99.63	2	31.29	1	5
63.30	4	3600.49	10	32.89	2	5
63.83	3	01.06	1	33.20	2	5
64.37	2	01.55	1 +	33.91	1	5
64.70	1	02.99	2	34.40	3 + d?	5
65.85	1	03.33	1	35.00	1	5
66.24	1	04.49	1	35.40	3	5

Dy

Funken

3:15	1	3715:72	2	3759:45	1	3812:42	1
3:71	10	16:61	1	59:82	1	13:81	2
7:41	1	17:08	3	60:20	1	14:72	2
8:20	1	18:20	2 +	60:98	1 +	16:33	2
8:66	1	18:80	1	62:40	1 +	16:90	4
9:40	1 +	19:54	1	62:89	2	17:55	1
0:02	2	21:74	1	64:41	1	18:90	1
0:75	1	24:55	5	64:97	2 +	21:92	2
2:10	1	25:54	2	65:30	1 Tb?	22:75	2
2:70	1 +	26:09	1	67:75	2	25:78	2
3:19	1	26:66	1	70:34	1	28:34	2
3:54	1	27:72	2	70:78	1	28:62	1
4:54	1	28:10	1	71:21	2	29:60	2
5:01	2	28:86	1	73:18	2	29:78	2
5:93	3	29:30	1	73:45	2	31:20	2
7:07	1 +	29:7	1 + br	74:90	1 +	31:79	2
8:50	2	30:75	2 + br	77:07	1	32:49	3
0:20	1	31:25	1	77:60	1	33:00	1
0:76	1	31:53	1	78:10	1 +	34:71	1
0:51	1 +	32:28	1 +	79:39	2	36:62	4
0:76	1 +	34:15	1	79:87	1	38:01	1
1:40	1	34:48	1	80:45	1	38:84	1
1:08	1	36:06	1	81:63	1	39:97	1
1:52	2	38:48	1	82:30	1	41:03	2
1:99	10	38:72	1	83:03	1	41:48	2
1:79	2	39:48	2	83:70	2	42:12	1
1:30	1	39:97	1 +	84:09	2	43:13	2
0:09	2	40:20	1	84:80	1	44:40	2
1:45	2	41:05	1 +	85:56	3	46:50	1
1:30	10	41:30	1	86:31	5	47:16	1
1:14	1	42:00	1	87:36	3	49:53	2
1:70	2	42:40	1 +	88:59	4	50:65	1 +
1:72	4	43:17	1 +	90:12	1	53:19	3
1:17	2 +	45:19	1	92:01	2	55:04	2
1:00	1 + br, Tb?	46:48	1	93:65	1	55:80	2
1:73	1 +	48:00	8	94:48	2	59:36	1
1:00	1	50:48	2	95:54	1	62:82	1
1:55	2	51:92	2	97:07	1	64:20	1
1:72	3	52:95	1	3802:08	2	65:62	1
1:35	3	53:65	3	02:90	1	66:70	2
1:20	3	53:92	4	03:25	2	68:00	1
1:86	2	54:89	1	04:30	2	68:60	2
1:79	3	55:27	1	06:44	10	68:97	2
1:25	1	55:55	1 +	07:76	1	69:30	2
1:99	1	55:90	1	08:10	1	69:54	2
1:99	2	56:71	1	09:21	2	70:02	2
1:69	1	57:20	2	09:60	1	72:24	5
1:00	1	57:50	8	09:91	2	74:20	3
1:44	2	59:10	1	10:45	1	76:64	2

3878:10	1	3953:23	1 +	4014:02	1	4091:94
79:21	1	54:64	3	14:90	2	96:28
82:10	1	56:90	1 +	15:25	1	99:03
87:66	1	57:36	1	17:94	1	4100:07
89:15	1 Nh?	57:90	3	19:60	1 +	01:56
91:15	1 + Nh?	59:49	1	19:72	1	02:12
92:01	2 +	59:80	1	21:06	2	03:50
93:05	1	60:95	1 +	23:39	1 +	04:05
95:50	2	62:70	1 + d	23:88	1 +	05:21
97:01	1	63:95	1	24:60	2	06:65
98:70	10	64:85	1	25:81	1	06:85
3902:56	1	65:25	1	27:98	2	07:38
04:36	2	68:53	15 (Ca)	28:53	3	10:05
06:00	1 +	70:11	1 +	29:59	1 +	11:53
08:13	1 +	71:30	1	32:64	4	13:20
09:30	1	71:79	1	33:81	2	14:23
09:50	1	73:40	1 +	36:48	2	15:50
09:80	1 +	73:95	1 +	38:65	2	19:40
10:21	1 +	75:16	1	38:99	1	24:80
10:70	1 +	75:48	1 +	42:10	2	26:20
11:81	1	77:53	1	46:17	4	28:40
12:32	1 +	77:96	1	47:95	1 +	29:20
13:03	1 +	78:72	10	48:51	1	29:50
14:15	2	79:60	2	49:00	1 +	30:50
15:01	3	82:09	5	50:72	5	31:20
15:72	3	83:81	4	53:51	1 +	32:20
17:49	1	84:38	3	55:30	3	33:00
18:15	1 +	84:84	1	55:90	1 +	33:50
18:70	1	87:23	1	57:56	2	33:90
19:30	1 + br	89:95	1	60:74	1	34:20
19:57	1 +	90:50	1	61:25	1	37:40
21:6	1 + br	90:92	1	65:29	1 +	39:60
23:49	3	91:49	3	66:51	1	40:90
24:60	1	92:05	1	68:15	1 +	41:60
29:85	1 +	95:90	1	68:67	1 +	43:20
30:83	1 +	96:18	1	69:90	1 + br	46:20
31:67	3	96:88	4	70:25	1 + br	47:20
32:32	2	98:80	1	72:80	1	52:50
36:19	1	4000:03	1	73:30	5	54:20
36:41	1 +	00:64	15	73:84	1 +	54:60
36:84	1	02:35	1	74:16	1	55:90
37:70	1 +	04:47	1	77:14	1	56:20
38:20	2 + d	06:01	1	78:15	10	57:20
39:79	1 +	06:26	1	81:99	1	58:20
40:90	1 +	07:95	1	85:35	1 +	58:50
42:64	3	10:25	2	85:52	1	58:80
44:82	10	11:47	3	87:36	2	59:20
47:06	2	12:00	1	87:98	1	60:20
50:51	3	13:00	1	91:70	2	63:20

8	1+br,d	4273:30	2 +	4431:15	2	4559:80	1
53	1	74:12	1 +	34:49	1 +	65:30	2
94	1 +	78:86	1	36:77	1	67:29	1
11	4	86:00	1 +	44:75	1	73:18	1 +
45	1 +	95:14	5	45:18	1	74:08	2
10	1 +	95:70	1 +	48:34	1	76:79	1
05	1 +	4308:79	4	49:32	2	77:99	3
00	1	14:04	2	49:89	4	81:62	1
75	1	22:68	1 +	55:79	2	83:23	1
50	1 +	25:27	2	56:54	2	84:97	1 +
03	2	28:1	1 + br	60:05	1 +	86:20	1 + br
55	2	29:08	1	61:30	1 +	86:40	1
87	3	30:02	1 +	68:07	1	86:85	1
99	4	39:80	3	68:31	2	88:11	2
10	1	46:51	2	71:31	1	89:53	5
81	3	47:90	2 +	76:81	1	92:00	2
01	4	49:25	1 +	77:69	1	95:33	1
19	2	54:30	1 +	80:85	1 +	96:97	1
51	2	55:45	1 +	82:53	1	97:67	1
42	2	58:61	2	84:58	1 +	4600:05	1 +
23	1	60:35	2	86:40	1	00:90	1
35	1	61:50	2	88:75	1	09:25	1 +
71	2	62:44	1	90:65	1	11:90	1 +
41	1	63:10	1	92:32	1 +	12:47	4
90	5	64:35	3 d	93:25	1 +	13:65	1 +
86	3	66:25	2	94:30	1 +	15:00	1
32	3	66:90	1	98:68	1	15:75	2
26	3	74:41	2	4500:11	1	17:45	2
29	3	74:93	2	01:45	1	20:21	2
33	3	75:50	2	02:72	1	20:59	1
20	1	78:50	1	03:41	2	22:56	1
4	1 +	80:40	1	06:25	1	24:30	1 +
0	1	84:48	1	07:11	2	24:60	1 +
50	1 +	85:45	2	15:21	1	28:29	2
4	2	89:96	1	15:73	1	29:25	1 +
5	1 +	95:14	2	17:13	2	31:70	1
6	1 +	96:25	1	18:70	2	35:53	1
8	2	4400:25	1	19:99	2	36:40	1 +
1	2	01:81	1	27:09	1	37:30	1 +
0	1 +	05:79	1 +	27:80	1	37:78	1
5	1 +	07:35	1	27:95	2	39:00	2
9	3	08:26	2 +	29:97	1 +	43:0	2 + br
7	1 +	09:59	3	38:90	1	47:50	1 +
5	1 +	11:55	1	41:85	3	49:62	2 +
8	1 +	18:24	1	45:51	2	50:35	1
0	1 +	19:09	1 +	51:05	1	51:73	1
5	1 +	20:50	1	56:64	2	52:80	1
1	1 +	21:84	2	57:70	1 +	53:60	1
2	1 +	27:01	1	58:31	1	54:91	1